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HEALTH AND THE ENVIRONMENT:
A CRITICAL ENQUIRY OF THE CONSTRUCTION
AND CONTESTATION OF ECOLOGICAL HEALTH

MAYA K. GISLASON

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Abstract

UNIVERSITY OF SUSSEX

**MAYA KRISTIN GISLASON
DOCTOR OF PHILOSOPHY**

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SUMMARY

A crucial contemporary public health issue is the construction and contestation of the relevance of the natural world to human health. Taking a critical approach, this thesis examines how the natural environment as a health determinant is positioned in relation to the 'social' within social epidemiological studies of health, illness and disease. Using conceptual and empirical forms of enquiry, this study shows how current constructions of natural environmental health drivers contour public health practice in the UK and that by challenging the limits of existing structures, innovative responses emerge, which can generate new frameworks for health policy and practice.

Having identified a lacuna in research on the 'natural' environment in medical sociology, this inductive qualitative research project brings into conversation the findings from extensive desk and field research. Specially, a study of the elaboration of environmental health discourses within the UK public health policy arena and disciplinary wide discourse analyses of key academic journals are read together to describe the discursive practices shaping environmental public health work in the UK. Linking theory to practice, data from in-depth interviews with sixty health professionals working on health and the environment in the UK and internationally are used to investigate how public health practitioners produce the environment within their work remits.

The research breaks ground for further social scientific studies of health and the environment and in particular substantiates the call for an extended notion of the 'environment' using ecological principles. Methodologically, the interdisciplinary reach of this research draws attention to the tensions that arise when working across the medical, natural and social sciences. Practical and philosophical questions about the challenge of expanding the sociological imagination in the contemporary moment are also considered. Empirically, to medical sociology the 'EcoBioPsychoSocial' framework is offered as a tool for studying health at the nexus between the 'social' and the 'natural environment.' Finally, the ways informal public health institutions are serving as 'invisible' forces impeding the uptake of prevention oriented environmental health policies are findings offered to the health policy arena.

Declaration

I hereby declare that this thesis has not been, and will not be, submitted in whole or in part to another university for the award of any other degree.

Table of Contents

ABSTRACT	I
DECLARATION	II
ACKNOWLEDGEMENTS	VII
CHAPTER ONE	1
EXPANDING THE SOCIAL	1
THEORETICAL FRAMEWORKS	4
KEY CONCEPTS	8
<i>The social</i>	8
<i>The natural environment</i>	13
<i>Health in the environment</i>	16
STRUCTURE OF THE THESIS	22
CHAPTER TWO	24
METHODS AND METHODOLOGY	24
COMPUTER ASSISTED QUALITATIVE DATA ANALYSIS SOFTWARE	25
DOCUMENTARY CONTENT ANALYSIS OF ENVIRONMENTAL PUBLIC HEALTH GOVERNANCE TEXTS	27
SYSTEMATIC CONTENT ANALYSES OF ACADEMIC JOURNALS	28
DATA GATHERING THROUGH IN-DEPTH INTERVIEWING	31
<i>Field research</i>	31
<i>The research participants</i>	33
<i>Ethical considerations</i>	36
<i>Interview schedules</i>	37
<i>Interview settings</i>	38
<i>In-depth interview dynamics</i>	39
CRITICAL DISCOURSE ANALYSIS OF INTERVIEW DATA	41
<i>Transcription</i>	42
<i>Coding and analysis</i>	43
REFLECTIONS ON THE RESEARCH PROCESS	45
CONCLUSION	47
CHAPTER THREE	49
THE UK PUBLIC HEALTH SYSTEM AND THE ENVIRONMENT	49
THE UK PUBLIC HEALTH SYSTEM	49
UK ENVIRONMENTAL HEALTH POLICY DOMAIN	56
CONCLUSION	76

CHAPTER FOUR	79
SOCIAL THEORIES OF HEALTH, PUBLIC HEALTH AND THE ENVIRONMENT	79
OVERVIEW	79
EARTH AND PLANET	85
NATURE	86
ENVIRONMENT	90
BIOLOGY	96
CLIMATE, WEATHER, AIR, WATER AND CHEMICALS	101
ENVIRONMENTAL HEALTH	104
ECOLOGY, ECOSYSTEMS AND BIODIVERSITY	110
CONCLUSION	115
CHAPTER FIVE	120
CONSTRUCTING AND CONTESTING THE ENVIRONMENT IN PUBLIC HEALTH	120
HISTORICAL LEGACIES: PUBLIC HEALTH AND THE ENVIRONMENT	121
DEFINING THE ENVIRONMENT	124
<i>Environment as context</i>	131
<i>Environment as agent</i>	133
THE ENVIRONMENT AS RELEVANT TO HEALTH	136
<i>Environment as a contested issue</i>	145
<i>Putting the environment to work within Public Health</i>	149
CONCLUSION	157
CHAPTER SIX	159
CONSTRUCTING AND CONTESTING ECOLOGY IN PUBLIC HEALTH	159
DEFINING ECOLOGY	160
<i>Ecology as ecosystem</i>	165
<i>Ecology as biodiversity</i>	173
PUTTING ECOLOGY TO WORK WITHIN PUBLIC HEALTH	179
CONCLUSION	186
CHAPTER SEVEN	189
THE SOCIAL, THE ENVIRONMENTAL AND PUBLIC HEALTH	189
THE SOCIAL-NATURAL ENVIRONMENTAL INTERFACE IS COMPLEX	189
<i>Social inequality, health and the environment</i>	199
<i>The social, the political and the environment</i>	203
<i>The social and health policy</i>	206

<i>The social through economics</i> -----	214
HEALTH DETERMINANTS -----	220
CONCLUSION -----	224
CHAPTER EIGHT -----	226
DISCUSSION AND CONCLUSION -----	226
THEORETICAL CONTRIBUTIONS -----	227
<i>Rethinking the sociological imagination</i> -----	227
<i>Expanding on the environment using ecological principles</i> -----	229
<i>Reviewing current conceptual frameworks</i> -----	230
<i>Bringing ecology to social epidemiology</i> -----	233
<i>The EcoBioPsychoSocial Model</i> -----	235
METHODOLOGICAL CONTRIBUTIONS -----	239
<i>Critical poststructural approach to social construction</i> -----	239
<i>Conferences as a site for field research</i> -----	240
<i>Knowledge translation across discourses</i> -----	241
EMPIRICAL CONTRIBUTIONS -----	242
<i>Upstream approaches to public health practice</i> -----	242
<i>Invisible obstacles to policy uptake</i> -----	244
FUTURE RESEARCH DIRECTIONS -----	247
BIBLIOGRAPHY -----	249
APPENDICES -----	267
APPENDIX ONE: OVERVIEW OF RESEARCH POPULATION ASSEMBLED -----	268
APPENDIX TWO: FIELD RESEARCH AT ACADEMIC CONFERENCES -----	271
APPENDIX THREE: INTERVIEW PACKAGE -----	276
APPENDIX FOUR: SUMMARY OF SYSTEMATIC CONTENT ANALYSIS OF JOURNALS -----	281
<i>Journal of Critical Public Health</i> -----	281
<i>Journal of Epidemiology and Community Health</i> -----	288
<i>Journal of Sociology of Health and Illness</i> -----	295

List of Figures

Figure 1. Environmental burden of disease for the total world population	18
Figure 2. Examples of distal environmental changes and disease	20
Figure 3. Overview of Research Methods Used	25
Figure 4. Scopus SJR Ranking	29
Figure 5. Five Mixed Purposeful Sampling Method Techniques Used	33
Figure 6. Distribution of thesis coding across the eleven key analytical themes	43
Figure 7. Summary of the Critical Public Health Journal Analysis	80
Figure 8. Summary of the Journal of Epidemiology & Community Health Analysis	82
Figure 9. Summary of the Journal Sociology of Health and Illness Analysis	83
Figure 10. Ways stakeholders become involved in environment and health issues	149
Figure 11. Stakeholder's use of environmental and ecological terms	159
Figure 12. Ways stakeholders become involved in ecology and health issues	179
Figure 13. Issues of complexity identified by research stakeholders	190
Figure 14. People at risk of displacement due to sea level rise	199
Figure 15. The Main Determinants of Health Model	221
Figure 16. The Health Map	222
Figure 17. The BioPsychoSocial Model	236
Figure 18. The EcoBioSocial Framework	237
Figure 19. The EcoBioPsychoSocial Model	238

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Chapter One

Expanding the Social

I know that the molecules in my body are
traceable
to phenomena in the cosmos
We are all connected;
To each other, biologically
To the earth, chemically
To the rest of the universe atomically.

Neil deGrasse Tyson



Humans inhabit living environments as one species amongst millions bound together within social and ecological webs of life-giving interdependence. At the heart of life the unit of survival is always organism *and* environment (Bateson 2000). The social sciences have generated bountiful insights into the ways humans inhabit their worlds which range from the sublime through to the horrific as humans beget the suffering of other human beings. Given the amount of work yet to be done to make the world a better place, for social studies of health it may seem counterintuitive to shift focus away from issues of social inequality and suffering in order to study the natural world. But then it is also becoming increasingly clear that misery grows in contexts of environmental degradation with profound implications for human health and wellbeing. What have been localised realities for decades are now becoming global realities as people compete for scarce natural resources such as potable water, food or fuel and climate driven floods, heat waves and other natural disasters collapse built infrastructure, tax social institutions and damage health and wellbeing. In this contemporary context, it is important to ask why health studies continue to focus primarily on social issues when the social-natural environment interplay is a crucial and commonly shared unit of survival for humanity.

Research on the links between human social activity, environmental degradation and human health centralises the view that the organism-environment unit is also key to human survival. Concerted appeals for action in the public health sector are coupled with predictions that in the face of declining resources and collapsing natural life support systems the maintenance of current levels of public health will become increasingly difficult, if not impossible (Aguirre et al 2002; WHO/Europe 2004; CIEL 2005; UNFCCC 2005; Soskolne 2008; Griffiths and Stewart 2009; DEFRA 2010; HELI 2011; MEA 2011; OHI 2011; WHO 2011a). Disregarding the importance of ecological integrity to human health—which is to lose sight of the whole health picture—is considered tantamount to “mortgaging the well-being of future generations against the greed of present generations, measured in terms of current trends in drawing down natural capital through overconsumption, population growth and growth in the abuse and/or inequitable use of technology” (Soskolne and Bertollini 1999, p. 21). Nothing less than the survival of human life on earth is the most basic public health concern in these discourses. The view held is that to move the focus away from producing sickness and towards generating and protecting health, the natural environment needs to be a core consideration of national health agendas and an organising principle of public health systems (Soskolne and Bertollini 1999; Aron and Patz 2001; Aguirre et al 2002; Lang 2009; Rayner 2009; WHO 2011d).

Addressing the intrinsic value of the natural world is at the heart of this thesis. Previously, too few sociologists had studied health as it arcs between cultures, medical cosmologies, peoples, historical eras and the natural environment. Samson (1999) is one scholar who has, and a device he uses to bring these seemingly disparate trajectories together is the concept of holism. The principle of holism is that parts of a whole are intimately interconnected and can neither exist nor be understood independent of the whole (Samson, 1999, pp. 3-5). Samson’s work shows that social thought and medical practice are informed by the same philosophical assumptions, which reify dualisms and normalise the separation of humans from their environments. Western philosophy generally and the biomedical cosmology specifically are built upon notions of co-eternal binary oppositions (Samson, 1999, pp. 3-4) through which the tacit view has emerged of humans as distinct from animals,

culture from nature, mind from body, scientific logic from subjective experience, and human health as separate from natural environmental health. Some describe these binary constructions of reality as having led to the 'death of nature' within Western cultures (Merchant 1983) and therefore medical thought making the 17th and 18th centuries not an Enlightenment but an 'Endarkenment' (Buhner 2004) whose legacy is still felt within health studies. Public environmental health issues challenge the Enlightenment view of nature as they connect to, and are connected by, the interplay between social and natural environmental activity (Dubos 1968; Benton and Redclift 2002; Bendelow 2009; Pilgrim, Samson and Pretty 2009). Health and illness states which are driven by natural environmental determinants challenge the contemporary moment when they leak out of binary frameworks and illuminate the complexity, interactivity and co-determinacy of humanity's relationships with the natural world (Dubos 1959; Bateson 2000; Moss and Teghtsoonian 2008; Samson 2008). Particularly evocative are those issues demonstrating that anthropogenic activity drives environmental events which in turn lead to human disease and suffering. In this thesis I take up the challenge of working in the spaces between environmental, social and health theories and in the tensions produced within dualistic frameworks about the relationships between these spheres within public health practice.

The question at the heart of this research is 'what would be the benefit to the sociological study of health and illness if it were placed at the nexus between the natural world and the social world?' Four supporting questions are: 1. 'Within public health responses, what are the gaps between theory and practice, academic conversations and field work, and health policy and organisational practices on the ground in relation to the social and the environmental?'; 2. 'What can a critical approach to social construction make visible about the relations of power at work in constructing and contesting the interconnection of the social and natural worlds?'; 3. 'How can taking an interdisciplinary approach, one grounded in social, ecological and health frameworks, facilitate a rethinking of the relationship between the social world and the natural environment in relation to public health?'; 4. 'How can this research help with, first, understanding the complexity of health issues produced in the nexus between the social and the environmental and, second, the imperative of distilling this

information into practices and frameworks which can be used both in the field of public health practice and in the health policy arena?’ A fifth question *cum* aspiration is 5. ‘May this research help to address the ‘irrationality’ of human activity which, through the course of building contemporary human societies, is producing human health injuries by significantly damaging natural environments and ecological systems.’

Mine is certainly an ‘interested’ research project. As standpoint feminists have argued, “the traditional epistemic view that knowledge is only achieved by adopting a disinterested, impartial view from nowhere is unachievable, for knowledge is always from somewhere” (Harding 2004, p. 93) as are the forces which shape a specific project. As Samson also argues “the social sciences take us only so far” as the primary methods used can “obscure as much as they illuminate” and therefore studies building an understanding of the ‘big picture’ theories and methods from other disciplines become indispensable to the research journey (1999, p. vii). Given this, the objectives of my research project are threefold: 1. To show that sociology can strengthen how it addresses new, complex and volatile health issues, many of which are environmentally driven public health injuries; 2. To show that because the natural environment tests the social sciences and public health medicine there is value in their working together to address these challenges; 3. To move social scientific studies of the environment and health forward by not only valuing the subject but also by demonstrating why the ecosphere is the appropriate meta-context for health studies.

Theoretical Frameworks

The theoretical traditions informing the conceptual frameworks of this thesis are social construction, critical theory, and poststructural theory. Given that this is an empirically driven thesis, the use of the theoretical frameworks described reflects a considered and problem-driven approach to using social theory.

Social constructionism, as a theory of knowledge, understands phenomena to be created within social, historical and political processes and contexts (Hacking 1999) which are subjectively experienced and interpreted (Berger and Luckmann 1991;

Hacking 1999; Green and Thorogood 2010). Green and Thorogood suggest asking 'who has the power to produce phenomena' and 'what are the implications' of these constructions is the best way to conduct a social construction inquiry (2010, p. 15-16). Acknowledged also is that over time, and through repeated use, these constructions become artefacts that are institutionalised and embedded (read: normalised) within the social sphere. In this thesis, social constructionism has been used to 'make strange' the key concepts of 'the social', 'the natural environment' and 'health' as well as the theoretical, public health and governance contexts within which these issues are being assembled in and through language. Challenging rather than taking for granted the definitions central to this research has freed me up to think about their production within specific moments, contexts and practices.

Critics of social constructionism argue that in extreme cases it can be too relativistic a method. They recommend this analytical strategy be strengthened by incorporating the view that the material world, particularly the natural world, is 'real' and therefore it is not the world that is constructed but meaning (see Green and Thorogood, 2010, p. 16). Another way to support social constructionism is to link the acts of building meaning with theories of power, thereby highlighting the iterativity between discursive activity, knowledge production and the various techniques and technologies of power put to work within social relations of power. Critical, poststructural, and postmodern theories have most persuasively brought to social construction theory strategies for analysing power in the social world.

In this thesis I have used critical poststructuralist theories to strengthen my social constructionist analyses. In sociology, theories of power are used in theory or as a general methodological tool (Burchell, Gordon and Miller 1991; Petersen and Bunton 1997; Wright 2000; Keenan 2001) or as methodological protocols within post-structuralism (Kendall and Wickham 1999), in Foucauldian analysis of discourse, knowledge and power (Foucault 1995; Akerstrom Andersen 2003; Foucault 2003) and the elaboration of genealogy into a Foucauldian Discourse Analysis framework (Kusch 1991; Anderson and Grinberg 1998; Wetherell, Taylor and Yates 2001). Theories of power also inform Critical Discourse Analysis (Fairclough 1989; Fairclough 2005) on

reflexivity (Bordieu 1992; Hill Collins 2000) and education (Gore 1995). Yet, power is not typically used in social constructionist studies. In addition, studies on health, illness, and disease do not often draw on post-structuralist theories but rather focus on the creation of knowledgability about illness and health (Fox 1994; Petersen and Lupton 1996; Petersen and Bunton 1997; Busby 2009).

Critical theory is useful for studying the social construction of experiences through the frameworks of discourses, power relations and the production of historical contexts (Kincheloe and McLaren 2005, p. 88). A desire to challenge positivism, which proponents point out is the most dominant form of ideology in late capitalism, is a key motivation of this conceptual project. Attacking the notion of value-free science, critical theory argues that scientific research—including the social scientific research of science—is itself a social process (Green and Thorogood, 2010, p. 18). I have used critical theory to inform my study of discourses and have put to work the idea that the subject is the accumulation of historical trends and projects and the way I am studying it is only possible within the synergies of the present moment. Taking to heart the notion of ‘dialectical imagination’ (Jay 1973) which is “the ability to view the world in terms of its potential for being changed in the future” (Agger 1991, p. 109; Agger 1998), I have also sought to be reflective and reflexive in my scholarship. My commitment to interdisciplinary dialogues has grown directly out of this approach as, following Samson (1999), I have clearly understood that sociology itself does not have sufficient conceptual or methodological tools for the task of studying health at the nexus between the social and the natural worlds.

Poststructuralism and postmodernism can be difficult to delineate. Agger suggests poststructuralism is “a theory of knowledge and language, whereas postmodernism is a theory of society, culture, and history” (1991, p. 109). He argues for “a blending of poststructuralism and critical theory that trades heavily on Derrida’s model of textual analysis” (1991, p. 112). According to Agger, Derrida maintains through his notions of deconstruction that a text is

undecidable in the sense that it conceals conflicts within it between different authorial voices—sometimes termed the text and subtext(s). Every text is a contested terrain in the sense that what it appears to “say” on the surface

cannot be understood without reference to the concealments and contextualizations of meaning going on simultaneously to mark the text's significance (e.g. the use of specialized jargon). (1991, p. 112)

Following this instructive, I have sought to “reveal the values and interests suppressed far beneath the surface of science” (Agger, 2011, p. 114) within health practice constructions of the environment and health, including in moments of contestation. Efforts to disagree with and even negate ideas, practices, phenomena or experience showcase the tensions between the elements structuring the dispute. Foucauldian theories of power, which Agger suggests are postmodernist, make explicit the interactivity between the discursive and the material in the production of the social world (see Gislason, 2010). Using these three theoretical approaches in concert, I have:

Challenged the territoriality of sociology, including its differentiation from other disciplines in the human sciences as well as its heavy reliance on method with which to solve intellectual problems ... These three theoretical perspectives redefine the human sciences and cultural studies in ways that blur traditional disciplinary boundaries (Brodkey 1987). They are all committed to interdisciplinarity (see Klein 1989), and deconstructing disciplinary differentiation as arbitrary. (Agger, 1991, p. 126)

Agger concludes his comparative article on the three perspectives by suggesting that they ultimately help to “rethink the prevailing definition of what counts as sociology; [and] enlarge that definition considerably” (1991, p. 126). Such a rethinking is essential to the project of studying concepts traditionally disconnected from one another within the social sciences and medicine. These three frameworks also emerge out of social theory at a time when “modern life has taught us that both nature and humankind are more complicated than the dialectical notions of the nineteenth century supposed” (Raskin in Lee, 1997, p. 17). They show ways to circumnavigate modern theoretical preoccupations with deterministic, linear explanations within the individual and society matrix and acknowledge that sociology “was born at a time when science was not easily divided between the “natural” and the “social” [and] when there was a curiosity about [nature] and systematic inquiry into all aspects of the world in which they lived was conducted, generally without specialization” (Lee 1997, p. 16). Bringing these insights forward is a move towards non-modern social theory where the divide between nature and humans is considered a fiction and the interplay between them is seen to not only constitute but also to transcend social reality (Latour 1991; Lee 1997).

Key Concepts

The following sections in this chapter activate the aims, objectives and analytical framework of this thesis and begin by defining the three key concepts of the social, the environmental and health (particularly in relation to the environment). These definitions serve as cardinal points in this research as they are demarcated conceptual frameworks within which the social and the natural are defined and the tensions between them are conceptually useful. Cognisant of critical social constructionist approaches which underscore the importance of studying concepts as assemblages of meanings this thesis also considers how discourses are produced by people within specific disciplinary frameworks through myriad and detailed activities which are carried out in particular social relations of power. Relatedly, deconstructionism advocates that concepts be studied in their textual contexts of production in order to 'de-sediment' the signification of truth (Derrida 1976) and this is specifically considered in relation to disciplinary contexts of production.

The social

In sociology, 'the social' demarcates a phenomenon created through individual or collective human activity and which plays a role in producing the social world. The 'sociological imagination' (Mills 1959) is a central concept offering instruction on how to approach the study of the social world. To rethink the social is, therefore, to rethink the terrain of the sociological imagination. This is challenging, as Luhmann suggests, because

Sociology can only describe society in society ... It is a science of the social system and a social system of science. To make matters even more complex, as a science and, as a social system, sociology is also an internal observer of whatever system it participates in. (Luhmann 1994, pp. 132-133)

Undaunted and informed by a Weberian holistic view of sociocultural systems, Mills developed the tool of the sociological imagination in which he acknowledged humans as biological, physiological, and sensate beings. He also espoused the study of humans as historical actors whose lives are produced through sociocultural structures:

We cannot adequately understand 'man' as an isolated biological creature, as a bundle of reflexes or a set of instincts, as an 'intelligible field' or a system in and of itself. Whatever else he may be, 'man' is a social and an historical actor who must be understood, if at all, in close and intricate interplay with social and historical structures. (1959, p. 158)

The sociological imagination has endured as an important analytical tool and has been revisited since its presentation to social theory by feminist (Smith 1989), postcolonial (Bhambra 2009) and sociological undertakings (Fuller 2006), to name a few. As in the making of the modern world and the biomedical cosmology, the development of sociology has also centred on a negotiation over the relationship between nature and culture, often expressed in binaries casting the social and the biological into different spheres. Fuller's 'new sociological imagination' shows that 'purified' notions of disciplines are still being utilised to demarcate disciplinary projects. Arguing for the development of a 'proactive sovereignty' for sociology—as distinct from biology—Fuller aims to develop 'anthropic scholarship' as a way to address the key social issues of our time. He is concerned, at root, with the survival of *Homo sapiens*. Pushing against naturalism, the biological turn in sociology and the 'greening' of political thought, Fuller argues that these 'naturalistic' turns distract attention away from the real issue, which is that contemporary concerns, such as war and religious conflict, make humans the most important endangered species on the planet. Of course, the project is more nuanced than this; yet, it also illustrates that in the face of profound human misery the social theoretical impulse to reject the idea that the natural and the social are co-determining is still widely supportable. Looking at issues through the perspective of an integrated whole is, therefore, nonessential to social theory. Mills' recommendation is to study opposing concepts together, as it is this juxtaposition that helps to illuminate the social issues of an era (1959, p. 132-134).

Deeply cautious about the notion of the 'social', scholars such as Bruno Latour suggest the framework should be examined carefully when it is used to designate

a stabilized state of affairs, a bundle of ties that, later, may be mobilized to account for some phenomena or another. There is nothing wrong with this use of the word as long as it designates what is *already* assembled together. Problems arise however, when 'social' begins to mean a type of material, as if the adjective was roughly comparable to other terms like 'wooden', 'steely',

‘biological’, ‘economical’, ‘mental’, ‘organisational’, or ‘linguistic’. (Latour 2007, p. 1)

What, then, is the social particularly when considered in relation to the place of the natural environment within social worlds? A linguistic interlude shows that the Latin *socius* refers to the interactivity and co-existence of organisms (irrespective of their awareness of interconnection or whether or not their interactions are voluntary) within communities. A group of organisms (humans, plants, animals) sharing common resources (derived from nature, culture and society) constitutes a community (Barnes 2000). As is illustrated by Fuller, social scientists have argued that this definition is unwieldy and requires further demarcation to be ‘fit for purpose’. Not surprisingly, the honing of ‘the social’ has involved a scything of the organistic and the natural from conceptualisations of the human world, thereby producing an anthropocentric approach to building theory about the social world.

The story of geography offers a contrasting account of history—one showing that far from being separate in this moment in history, humans and the earth are increasingly co-constitutional. According to geographers, the post-glacial geological epoch we have lived in for the past ten to twelve thousand years, is most aptly called the

Anthropocene (the Age of Man):

Without major catastrophes like an enormous volcanic eruption, an unexpected epidemic, a large-scale nuclear war, an asteroid impact, a new ice age, or continued plundering of Earth’s resources by partially still primitive technology ... *mankind* [sic] will remain a major geological force for many millennia, maybe millions of years, to come. To develop a world-wide accepted strategy leading to sustainability of ecosystems against human induced stresses will be one of the great future tasks of *mankind* [sic], requiring intensive research efforts and wise applications of the knowledge thus acquired in the noosphere, better known as knowledge of the information society. An exciting, but also difficult and daunting task lies ahead. (Crutzen and Stoermer, 2000, pp. 17-18)

What light do these observations shed on the story of survival being told by sociologists? What implications do these insights into the impact of human social activity on the structure and functioning of the planet itself have for health studies (Merchant 1983; Crutzen and Stoermer 2000; Carlisle and Hanlon 2008a)? The silences

on the subject precipitate further scrutiny of the social and how it is produced through relations of power which construe the natural world as an absent presence within the Western world (Nash 2006). An imperative of this research has been to reject 'purified approaches' which relegate the natural and the social to discrete domains as it impedes a study of the 'bigger picture,' even though this framework is a hallmark of classical sociology (Hinchliffe and Woodward 2000). Instead, an ecologically informed conceptualisation of 'the social' has been selected. Such a conceptualisation sees humans as part of an assemblage of human and non-human communities which are intrinsic to the ecosphere and through which the living world is shaped.

Environmental sociology is one arena where the environment is treated as integral to the social world. This sub-discipline draws on work by some of sociology's founding thinkers, in particular Karl Marx and Emile Durkheim, who theorised the social without removing it from its larger earthly context. Not only *where* (the space between the social and the natural environment) but also *how* the social is produced is important for social theory. Karl Marx and Friedrich Engels developed their approach to (conflict) social theory around the notion of interdependence (Foster 1991; Foster 2000). Importantly, interdependence helped them highlight the necessity of human-environmental interactions in the construction of the social world through frameworks such as dialectical materialism (used to study the phenomena of nature through discourse). Here 'nature' is an integrated whole which connects phenomena organically and within which things are dependent and co-determinate. What is more, interdependence refers not only to emotional connection but also to occurrences of economic, moral and ecological inter-reliance.

Studying the links between Marxian thought and the environment, Stalin showed how Marx and Engels drew examples from Darwinian science through to chemistry and medicine to make their point:

The dialectical method requires that phenomena should be considered not only from the standpoint of their interconnection and interdependence, but also from the standpoint of their movement, their change, their development, their coming into being and going out of being. (Stalin 1940)

Stalin also underscores that in *The Communist Manifesto* (1848) Marx and Engels described the universal interdependence of nations and the alienation of human labour as connected to the estrangement of human beings from nature. In *The Grundrisse* Marx laments how humans and nature are brought into association through relations of production:

It is not the unity of living and active humanity with the natural, inorganic conditions of their metabolic exchange with nature and hence their appropriation of nature, which requires explanation or is the result of a historic process, but rather the separation between these inorganic conditions of human existence and this active existence, a separation which is completely posited only in relation of wage labor and capital. (Marx in Foster, 2000, p. 1)

The notions of interdependence, connection, and associations presented through dialectical materialism are useful to this thesis. Even though the project is not to develop a Marxian analysis, Marx's observation that through industrialised (now globalised) economic systems the relationship between humans and the natural world is increasingly fragmented is drawn on to help explain the various forms of disaffection emerging in post-industrial societies. Certainly for health studies a present-day concern is the link between rampant economic development, its erosion of ecological integrity and the resilience of earth systems and human health.

Durkheim's works is also important as his project was not only to study how societies maintain coherence and integrity but also to promote the discipline of sociology as a holistic method for studying societies as large integrated wholes (Durkheim 1950). Durkheim observed that society is more than the sum of its parts and that it functions as an organic whole, a 'thing-like' entity with its own life and logic. Durkheim's approach opens up possibilities for theorising society as does the notion that change (in social beliefs, actions and architecture) is a 'social fact'; making fluidity and growth fundamental qualities of the social world. A functionalist view of society as a system or, in other words, an organism actively invokes the natural world as metaphor but also as a presence (not an absence) shaping the human world. Using ecological principles to expand upon Durkheim's notions of holism, organicity, and integrity strengthens social theorising of communities as organic wholes and illustrates that ecology is a helpful disciplinary partner when studying 'the social' world.

The natural environment

Latour suggests that “‘society’ and ‘nature’ do not describe domains of reality, but are two collectors that were invented together, largely for polemical reasons” (2007, p. 110). Purified notions of the separateness of the natural from the social have permeated classical social theory and are often relatively stable ‘social facts’. Contemporary preoccupations within social theory include the debate about whether anything is really ‘natural’ anymore and, if so, where does nature end and the social begin? For example, green spaces, parks, gardens, forests, and even areas of re-wilded wilderness are shown to be manufactured through human activity in tandem with natural forces (Greening 2009, p. 164) and work on the wilderness is rarely conducted within social theory (Benton and Redclift 2002). Another strand of theory has been to bring the environment into social thought through an increased usage of natural metaphors (‘the natural turn’). While this ‘turn’ enlivens language through references to nature it does not herald the inclusion of biota into conceptualisations of the social to the degree that thinking socially would lead to ‘immersion thinking’ which is rooted in the observation that:

we are immersed in life. We breathe it in, we walk on it, we touch it. Each footstep on a fertile lawn or forest mat will send tremors to trillions of bacteria, millions of algae, fungi, and protozoa, and hundreds of insects and worms. The skin on our bodies, when viewed microscopically, is a teeming matrix of tiny caverns filled with bacteria, viruses, and mites ... Life abounds most everywhere inhabited by humans. Life thrives on the nutrients in the soil and water, the oxygen and carbon dioxide in the air, and on the sunlight that ultimately powers most life. (Moore, 2002, pp. 1-2)

In effect, these theorisations can ensnare ‘the natural’ within metaphor, putting natural images to the task of thinking about the social (as a purified space) (Code 2006). Overall, these efforts do little to destabilise the anthropocentrism of much social theory which conceives of the environment as either separate from the social or as a ‘setting’ for the main event: the human drama.

Theoretical movements calling for the natural environment to be placed centrally within the social imagination have done the most for removing purified notions of the social. Beginning in the 1960s and 1970s environmental sociology was revitalised and

offered fresh frameworks for theorising the social and the environmental as interactional. Catton and Dunlap offered to social theory 'The New Ecological Paradigm' (NEP) as an alternative to what they termed the 'Human Exemptionalist Paradigm' (HEP)—the purified view of humans as 'exempt' from environmental forces because of their social, cultural, economic and technological prowess (Catton and Dunlap 1978; Catton and Dunlap 1979; Catton and Dunlap 1980). In the midst of social uprisings, Eco-Marxism was also developed by using social conflict theories to conduct materialist analyses of environmental conflicts in the 1970s. The societal-environmental dialectic proposed by Schnaiberg was a substantive contribution of this neo-Marxist movement as it observed that governments and industries continued to privilege economic growth over environmental integrity and even over the health and wellbeing of the populace, unless and until economic and political commitments to sustainable development were seriously called into question (Schnaiberg 1980).

In the 1980s and 1990s, an integrationist approach was developed, which Buttel and Humphrey refer to as 'the sociology of environmental reform' (Buttel and Humphrey 2002). Departing from more radical, anti-establishment theoretical movements of the 1970s and 1980s this approach engendered collaboration. Ulrich Beck (1995) is a social theorist whose work reflects the ethos of his time. He develops a project of reflexive modernisation emphasising the external 'environmental' character of hazards as well as their 'suppressed sociality'—the social drivers behind them. He cautions that *post-histoire* thinking, the view of the immortality of human societies, is in fact thinking that produces an 'end-of-societal-history' thesis because it fails to consider the role of humans in producing the hazards of the time. He posits that the survival of the social habitus (but not the natural world *per se*) will be dependent upon overcoming the principle of 'organised non-liability' which denies the presence of hazards ('makes them mute') and also makes it difficult to assign responsibility for ameliorating the risks they pose. Rallying optimism, Beck (1995) argues that the way forward is to build an ecological democracy based on principles of accountability.

A quintessential approach of environmental social theory emerging out of the 1990s and 'noughties', however, is Ecological Modernization Theory (EMT). Described as "the

social scientific interpretation of environmental reform processes at multiple scales in the contemporary world” (Mol, Spaargaren, and Sonnenfeld, 2009, p. 1), EMT focuses on how “environmental interests have become incorporated into more and more aspects of social relations and institutions, as well as into contemporary human values, cultures and everyday practices” (Mol, Sonnenfeld and Spaargaren 2009, p. 1). EMT, its proponents argue, replaces the concept of sustainable development (SD) because to SDs political and economic preoccupations it adds analytical and sociological awareness (Spaargaren, Mol and Buttel 2000, p. 333). Appreciating that movements ebb and flow and therefore ideological change and social practices change across uneven trajectories, critics of EMT echo a question posed to earlier social and theoretical movements: can EMT change structures in ways that earlier movements could not? Their concern is that in the ‘new green wave’ of the 21st century incorporation will continue to be *ad hoc*, even in contexts where there is the capacity to respond comprehensively, such as in advanced capitalist societies (Goldsmith et al 1972; Lafferty and Hovden 2002; Coffey and Major 2005).

While only a decade has passed since the environmental theoretical discourses discussed above were presented (perhaps not enough time for social theory to be significantly revised) pressing real world issues suggest it is time again for sociology to consider the relationship between humans and the natural world. Global environmental change, the links between ecological degradation and civil conflicts, increasing environmental illnesses and the exhaustion of natural resources are all traceable causes of human illness and suffering. In fact, it is increasingly difficult to see human beings as standing outside of the natural world (Cochrane 2010):

in a world where risk and uncertainties seem to be piling up on top of one another. If we are to make improvements to people’s lives, not to mention other species lives, then any attempts to understand nature without society, or to understand society without nature, will prove insufficient to the task. (Hinchliffe and Woodward, 2000, pp. 3-4)

There is work waiting for medical sociologists in sociological sub-disciplines such as environmental sociology as well as in other disciplines, such as the initiatives on health in the environment described in the following section (Chivian and Bernstein 2008;

IPCC 2011; MEA 2011). These knowledges are already treated as pertinent to the social world as they are being used to form policy, catalyse social movements and reformulate philosophical and humanist assumptions about humans' place on the planet. Medical sociologists are markedly absent from many of these forums, reflecting a similar silence in sociological theory on matters of the natural world.

Health in the environment

One of the goals of this thesis is to address the silences identified above by moving from a focus on health to a deliberation of health *in* the environment. Thus far the key concepts of 'the social' and 'the environmental' have been discussed and it is now to the concept of 'health' that the discussion turns. Like 'the social' and 'the environmental,' 'health' (as well as related concepts such as wellbeing, illness and disease) are "as much a social construct as a biological characteristic. [Health] is the product of a complex interaction of different factors: this is true at both individual and population levels" (Sengupta 2009, p. 19). Health is also different in that it is contoured not only by cultural frameworks, social forces and disciplinary contexts replete with their respective traditions and values (Rose 2006; Shilling 2008; Turner 2008) but also by personal experiences which are lived in and through the intimacy of one's own biological body (Williams and Bendelow 1998b; Moss and Teghtsoonian 2008). Yet, making the theoretical connection between an 'environment' out there and 'health' in the body (or groups of bodies if a population is affected) can be difficult.

This is also true within biomedicine as is evidenced when the links between environmental drivers, disease emergences, injury events and anthropogenically induced environmental destruction are contested (Kroll-Smith, Brown and Gunter 2000; Moss and Teghtsoonian 2008).

One source of the challenge is that understanding health in the environment requires working in the tension between abstraction and specificity and at the interface between forces traditionally divvied up as the turf of medicine, science or the social sciences. The World Health Organisation's (WHO's) universal definition of health through its declaration somewhat confounds the clear demarcation of what health is

and who is responsible for it as it is imagined as a “state of complete physical, mental and social well-being and not merely the absence of disease and infirmity” (WHO 1946). Factors thought to determine health are, however, largely social with social determinants of health being:

The conditions in which people are born, grow, live, work and age, including the health system. These circumstances are shaped by the distribution of money, power and resources at global, national and local levels, which are themselves influenced by policy choices. The social determinants of health are mostly responsible for health inequities –the unfair and avoidable differences in health status seen within and between countries. (WHO 2011e)

Health at the scale of the social is the remit of the public health sector. Not surprisingly the discipline of public health is interdisciplinary and is referred to as both an art and a science (explored more fully in Chapter Three). Reminiscent of the Bateson observation of the environment-organism interface, the WHO definition highlights that health can be supported, improved or detracted from depending on the setting (Stewart and Jarvis 2009, p. 168). While public health has traditionally placed most of its attention on social and built environments, the natural environment is a third public health milieu and has a corresponding theory of environmental health determinants which are used to study the natural environment-human health interface—and are the focus for the remainder of this section.

The concept of ‘environmental health’ has emerged as a principal framework through which public health work links human health to environmental determinants.

However, as I showed with the concepts of the social and the environmental more generally, what ‘environmental health’ means is also a highly variable construct. At the broadest level, environmental health determinants are understood to be

all the physical, chemical, and biological factors external to a person, and all the related factors impacting behaviours. [Environmental health] encompasses the assessment and control of those environmental factors that can potentially affect health. It is targeted towards preventing disease and creating health-supportive environments. This definition excludes behaviour not related to the environment, as well as behaviour related to the social and cultural environment, and genetics. (WHO 2011a)

Environmental health determinants have been used to show how environmental degradation can be linked to human health injuries. The WHO, for example, holds environmental hazards responsible “for as much as a quarter of the total burden of disease world-wide, and more than one-third of the burden among children” (WHO 2002). Recent studies show that environmental factors influence 85 out of the 102 categories of diseases and injuries listed in The World Health Report (WHO 2007) and globally “as many as 13 million deaths could be prevented every year by making our environments healthier” (Prüss-Üstün and Corvalán 2006a). In the least developed countries, one third of death and disease is thought to be a direct result of environmental causes. The figure below shows the main diseases contributing to the environmental burden of disease for the total world population:

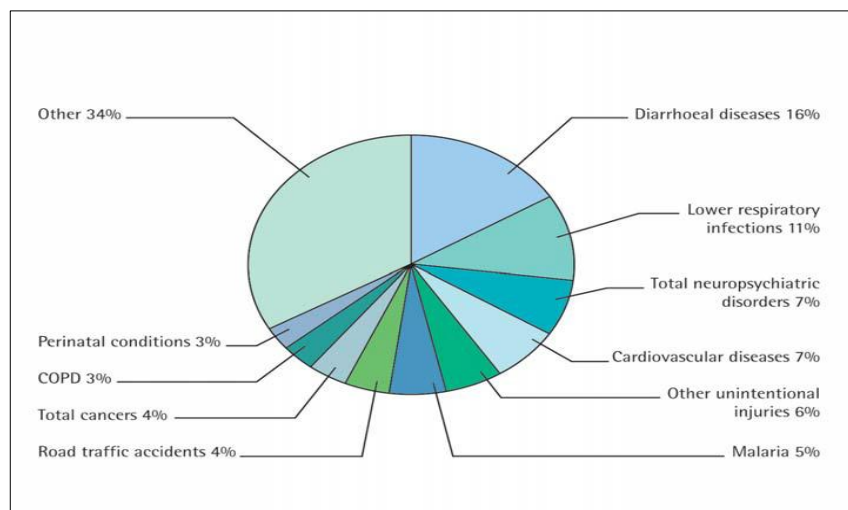


Figure 1.
Environmental burden of disease for the total world population (Prüss-Üstün and Corvalán 2006b, p. 62).

In material terms, these findings draw attention to incredible suffering where the degradation of the social and the environmental meet:

- Four million children die annually from diarrheal diseases acquired from contaminated food or water.
- Over one million people die from malaria each year.
- Over one billion people are unable to meet their basic needs (i.e., adequate food, clean water, and shelter) because they lack the necessary income or land.

Research from the WHO ‘The Health and Environment Linkages Initiative’ (HELI) also shows that these trends are likely to intensify as

rapid, unplanned and unsustainable patterns of urban development are making developing cities focal points for many emerging environmental and health hazards. As urban environments grow, the quality of the urban environment will play an increasingly important role in public health with respect to issues

ranging from solid waste disposal, provision of safe water and sanitation, and injury prevention, to the interface between urban poverty, environment and health. (HELI 2011)

While environmental hazards are taking a far greater toll on human life and suffering in absolute terms in the developing world, they are also a way to explain a complex interplay of factors generating disease in the developed world (Soskolne and Lee 2002). In countries with more robust health care systems and resources, producing healthier environments could significantly reduce the incidence of cancers, cardiovascular diseases, asthma, lower respiratory infections, musculoskeletal diseases, poisonings, and drowning (Prüss-Üstün and Corvalán 2006a). In the European region for example, 20%-24 % of all deaths are considered to have the environment as a major contributing factor, which has led to EU-wide initiatives to study health in relation to air quality, chemical safety, environment and health information systems, housing, noise, and occupational health, with a focus on children's health (WHO/Europe 2011). A key challenge, the WHO argues, is that "only collaboration between different sectors can protect human health from risks from a hazardous or contaminated environment" (ECEH 2011). How to work together to achieve these goals is a pressing and real set of challenges for public health organisations around the world.

Produced through science and interpreted within biomedical frameworks, research on environmental health injuries is being cited as a significant health phenomenon of the 21st century (McMichael et al 2003; Corvalan, Hales and McMichael 2005; Soskolne 2008; IPCC 2011). Exactly how these issues are becoming important (again) also matters. In health studies, as in social theory, environments are often framed as health hazards (potential threats which can be sources of a health injury) or risks ("a quantified estimation of that threat" (Stewart and Jarvis 2009, p. 169). Since the 1990s sociological debates on the paradigm of risk have proliferated also, and underscore how risk thinking is central to the *Weltanschauung* (worldview) of modern culture (Beck 1992; Giddens 1999). As is the case with risk society, modern health systems also organise themselves around ideas about risks, with environmental concerns becoming increasingly pertinent to issues of safety or preparing for the future (Beck 1995;

Giddens 2009). Within the context of public health, public health practitioners look for empirical things such as diseases and syndromes “that might have environmental causes or which are modified, either positively or negatively, by an environmental factor” (Stewart and Jarvis, 2009, p. 170). The ‘source-pathway-receptor’ link is the formula used to ascertain if there is an environmental driver at work and the rule is if one or more of the three is missing there can be no threat to health.

Medscape® www.medscape.com		
Environmental change	Description	Disease
Hospitalization	Increased people and time spent in hospitals	Tuberculosis (TB)
Urbanization	Increasing migration to and growth within towns	Enteric and respiratory diseases Dengue fever Diseases caused by fecal-oral pathogens Diseases caused by TB Multidrug resistant TB and salmonellosis <i>Salmonella typhimurium</i> Schistosomiasis
Antibiotic usage	Emergence of antibiotic-resistant strains of bacterial pathogens	Malaria
Water projects	Water flow changes due to dam construction and irrigation networks	Cryptosporiosis Diseases caused by <i>E. coli</i>
Agricultural intensification	Changing crop and animal management practices; fertilizer and biocide use; use of genetically modified organisms Increased interplay between humans and domesticated animals	Influenza, severe acute respiratory syndrome (SARS), avian flu
Deforestation	Loss of forest cover, changing water flow patterns Reforestation and human encroachment along and into forested areas	Malaria Lyme disease Hemorrhagic fever AIDS
Transportation projects	Construction of roads, increasing access to remote areas	Malaria STDs
Natural perturbations	Large-scale climate and other changes such as El Niño events	Cholera and leptospirosis
Cataclysmic events	Localized landscape changes caused by earthquakes, tsunamis, large fires, and other	Water-related diseases like cholera
Climate change	Changing temperature and precipitation	Malaria, dengue fever, and schistosomiasis

Figure 2.
Examples of distal environmental changes and disease
(Eisenberg et al 2007b)

Myriad initiatives are trying to develop measurements for ‘environmental’ risks or hazards and how the environment is being defined within them is of interest to this study. The figure above shows some of the links between environmental change, social structures and systems, and disease emergences. It provides good examples of the direct and indirect mechanisms which link the social and the environmental through health phenomena. Of course, these issues also have explicit public health implications (Eisenberg et al 2007a).

Public health has a pragmatic mandate when it comes to health responses, as it is directed to ameliorate health damages. A definition of the environment must synchronise with the mandates and constraints of public health interventions, which means that often the environment is defined pragmatically. The criteria can be, for

example, that a natural environment be ‘amenable to change’ and ‘reasonably modifiable’ so that a public health intervention can be rationalised (Prüss-Üstün and Corvalán 2006a, p. 23). Such an approach is realistic but not based in the reality of the natural world and serves, therefore, as another example of the folding of the natural into the social in a way that engineers it to be ‘fit for (social) purpose’.

One strand of public health trying to move beyond the ‘cult of humanity’ (Dew 2007) approach to health protection is environmental epidemiology. Environmental epidemiology views the environment as an external factor which impacts people where they live, work and play. Social factors mediate the potential impact of the natural environment on human health as the environment affects people’s general states of vulnerability and susceptibility (measured through socioeconomic status, for example). However, the environmental epidemiological oeuvre is the consideration of two environmental vectors: 1. proximate (downstream) determinants of health—those closely related in time and space to the injuries they produce—and 2. distant (upstream) determinants, which are far apart in time and space from the harms they produce. More specifically, proximate environmental health determinants can be biological agents in the air, water, and soil while distant health determinants are often social in origin, such as:

policies that drive current levels of population growth, consumption and waste issues, and the uses of technology. For example, the environmental, transboundary transport of contaminants through the food chain has resulted in global chemical contamination. Other transboundary issues include acid precipitation, ozone, greenhouse gasses, and hazardous wastes. Global ecological integrity (i.e., the ability of life-support systems to sustain themselves in the presence of polluting forces) and global change (including concerns about climate change from global warming, ozone depletion, and the loss of biodiversity) are also distant health determinants. (Soskolne and Lee 2002)

Thinking about the environment as a vector activates the concept of the environment in a novel way for social studies of health. Bringing the natural environment centrally into the health equation as an agent and amplifying its range by considering both proximate and distant scales of time and space begins to underscore the social forces behind environmental health injuries. Comparing this dynamic view of the

environment and health to static ones often at work within social epidemiology shows how notions of the social, the environment and health are the product of specific social practices and disciplinary frameworks. Within the context of public health, 'health in the environment' becomes something more than the biological, the natural or the social—it becomes an enviro-social-biological administrative construct. In public health, administrative frameworks and organisational structures are involved in defining what a public health issue is and, in the case of environmental health, what aspects of the environment can be addressed by public health are also defined by considering these administrative and pragmatic frameworks (Gislason 2010). To study health at the nexus between the social and the natural environment, therefore, is also to study administrative, disciplinary, and socio-cultural activities in relation to natural processes and philosophical discourses on the realities of humans' dependence on the natural environment.

Structure of the Thesis

This thesis is looking at the relevance of the environment to public health and the possible benefits to health accrued through restoring the integrity and resilience of natural environments—a task which in the modern world would invariably involve social and economic reform with significant implications for the health sector. Confident that the environment 'matters' to public health, not only as a philosophical issue but also as one enshrined in public health acts, governance structures and the commitments of the UK health system (issues discussed in Chapter Three) this research project was launched. Chapter Two describes the methods and methodologies used to gather and analyse the data for this study. Chapter Three sets the empirical scene by introducing the structure of the UK public health system and discussing in detail (by way of an analysis of the development of an environmental health policy arena) how environmental and health issues are becoming mainstream public health considerations. Chapter Four is based on extensive desk research which analysed the discursive construction of the natural environment as it pertains to health within three important academic journals. Chapter Five presents an analysis of the interview data on the subject of how public health practitioners construct and contest

the notion that the natural environment is a health determinant. Their descriptions emphasise that in the field the demands on the public health sector contour public health responses more than do theory or broad policy mandates. Elaborating on notions of the environment, Chapter Six uses interview data to investigate moments when environmental health concepts are insufficient for the task of addressing a health problem and public health practitioners look to other disciplines, in particular ecology, for ideas. Chapter Seven, the penultimate chapter, brings the key concepts and theoretical frameworks introduced in Chapter One into conversation with the empirical data gathered on public health governance, theory and practice presented in the following two chapters to think through notions of health in the nexus between the social and the environmental within the context of public health. The final chapter, Chapter Eight, summarises the key findings of this thesis according to three areas of contribution: the conceptual, the methodological and the empirical. Reflections on directions for future research conclude this study.

Chapter Two

Methods and Methodology

The purpose of this chapter is to explain the methodological frameworks and methods employed in this critical study of health. Researching health in the nexus between the social and the environmental is a novel approach within medical sociology and literature on the subject is scarce. To address this lacuna, theoretical work from public health, social medicine and historical studies of public health has been brought into conversation with the medical sociology corpus. This thesis is, therefore, the result of an inductive qualitative research process (see Green and Thorogood, 2010, p. 28) and as such the textual data gathered serves the dual purpose of literature review and data. This chapter is divided into the following sections: 1. Computer Assisted Qualitative Data Analysis Software; 2. Documentary Content Analysis of Environmental Public Health Governance; 3. Systematic Content Analyses of Academic Journals; 4. Data Gathering Through In-depth Interviewing; 5. Critical Discourse Analysis of Interview Data; and 6. Reflections on the Research Process, which addresses the ethical dimensions of the study as well as its limitations.

When bringing sociological research into dialogue with health research more generally, the qualitative, inductive and interdisciplinary aspects of the study need to be recognised as techniques well established within sociology but recently embraced in the medical sciences (Green and Thorogood 2010). Increasingly, scholars are acknowledging that qualitative research which employs heterogeneous methodologies, theories and ontological and epistemological frameworks can add valuable knowledge to health care theory and practice (Kuper, Reeves and Levinson 2008). For example, both the *British Medical Journal* (BMJ) and the *Lancet* have contemplated the value of qualitative inquiry to health research and medical practice. In the BMJ, Pope argues that historically qualitative research has been a critical component of health services research and makes a contribution to contemporary issues because of its orientation to “the development of concepts which help us to understand social phenomena in natural (rather than experimental) settings, giving due emphasis to the meanings, experiences, and views of all the participants” (Pope

and Mays 1995). In the *Lancet*, Malterud argues that there are tools for evaluating the quality of the research and they include measuring the relevance, validity and reflexivity of the study (Malterud 2001). Overall, qualitative research serves as a complement to quantitative strategies and together they can constitute a careful study of phenomena.

Overview of Research Methods Used	
Methods of Data Collection	Aims
Documentary content analysis of historical and contemporary public health acts and environmental health policies.	To understand how the 'place' of the environment within UK public health governance and organisational mandates has been constructed over time (Chapter Three).
Systematic content analysis of entire academic journals.	To identify the discourses of the links between the natural environment and health as developed and circulated within the disciplinary milieux of public health, social medicine and medical sociology (Chapter Four).
In-depth, semi-structured interviews analysed using critical discourse analytical frameworks.	To understand how public health practitioners construct, contest and use their ideas about the natural environmental health drivers as relevant to their everyday work in population health policy and practice (Chapters Five and Six).

Figure 3. Overview of Research Methods Used

As the figure above illustrates, in this qualitative study three methods (triangulation) have been used to critically study discourses and practices (Pope and Mays 1995).

Computer Assisted Qualitative Data Analysis Software

Computer-Assisted Qualitative Data Analysis Software (CAQDAS) has been used throughout this study. Debates about the value of CAQDAS run through the qualitative research methods literature. Some contend that software programmes impose a rigidity in the data analysis process as well as decontextualize the data, thereby compromising the analyst's ability to make holistic statements about the big picture their data offers (Ness 2008). Proponents appreciate the closeness to the data these

programmes facilitate, the analytical tools which enable greater data manipulation through functions such as queries and matrix codes, and the ability to represent the data and their analysis visually through graphs and charts (Thompson 2002). Most specifically, CAQDAS are appreciated as data management software tools that are particularly valuable when working with large data sets.

In this research not only internet search engines and online archives were used but also Nuance's QSR NVivo 8 to organise and conduct the critical discourse analysis of interview transcriptions. NVivo was also useful for reflecting on the writing process, for example, in preparation for writing Chapter Seven, Chapters One, Three, Four, Five and Six were coded for key themes using the programme. In addition, the bibliographic software tool Endnote helped generate the bibliography and was indispensable to the processes of analysing the three journals. Finally, a handheld Sony digital voice recorder documented face-to-face interviews and telephone interviews were recorded using Pamela for Skype. The use of the computer is ubiquitous in this study and arguably a form of technology which contours thinking and writing in particular ways (Sundeen 2003).

For the CAQDAS to be valuable, however, they need to be used effectively (Silverman 2005). To this end, bespoke training was commissioned. Four one-hour, one-on-one sessions with a consultant from TaggOram helped me learn specialised skills in NVivo, with two key areas of focus being: 1. the structuring my coding tree so that I could maintain focus in my analytical framework and 2. conducting matrix coding queries to show trends in my analysis and to identify key areas of analytical activity, which I then used to guide further analyses. Two hours of bespoke EndNote training was used to customise the EndNote programme for this thesis. A final, and important, reason for using computer technology has been to gather data internationally without always having to travel which is particularly made possible through internet search engines and telephone recording devices. Overall, I have used CAQDAS to manage my extensive text-based data set with relative ease and to maintain my focus on analysing, reflecting upon and learning from the richness of the data gathered.

Documentary Content Analysis of Environmental Public Health Governance Texts

The contemporary world is 'multi-semiotic' (Fairclough 2005) and thus recorded, expressed and engaged with using a variety of formal and informal documents (Hodder 1998) which range from written policies and legislative acts to personal diaries, handmade quilts and photographs (Plummer 2001). The empirical focus of this research is the public health sector in the UK and therefore the documentary activity in this sector is important to this study. In order to verify that focusing on public health activities vis-à-vis a study on health and the environment is an appropriate subject of study formal governance frameworks guiding public health practice on environmental health issues in the UK were analysed. The Policy Arrangement Approach (PAA) framework guided this analysis as it can be used to look for both change over time and stability —particularly in the current moment—in environmental public health policy arrangements in the UK.

A policy arrangement is “the temporary stabilisation of the content and organisation of a particular policy domain at a certain policy level or over several policy levels in cases of multi-level governance” (Leroy and Arts 2006). This framework considers four interwoven dimensions of a policy arrangement: 1. actors and coalitions, 2. resources and power, 3. rules of the game, and 4. discourses. The documents examined for this chapter were environmental health policy documents collected from the WHO-Europe and EU level Ministerial Conferences on Environment and Health (1989, 1994, 1999, 2004), which served as data on international initiatives and the role of multilevel governances in shaping the UK policy context. At the national level, public health acts, policies, mandates and briefs from the United Kingdom Parliament, the Ministry of Health, the Department for Environment, Food and Rural Affairs (DEFRA) and The Health Protection Agency (HPA) were gathered using their online search engines as these are key agencies involved in drafting, ratifying and implementing environmental health legislation.

In all cases a systematic Boolean key word search for 'environmental health' was conducted and each instance identified was reviewed in order to identify change in meaning and usage over time. The findings of this analysis are presented in Chapter Three, 'The UK Public Health System and the Environment.'

Systematic Content Analyses of Academic Journals

Chapter Four is based on a second comprehensive desk research project, which was an analysis of the entire content of three journals between 1978 and 2010. The *Sociology of Health and Illness* was an obvious selection for this study as it is a cornerstone publication of the medical sociology discipline, particularly in the UK. In that this is a critical analysis of public health practice, the journal *Critical Public Health* was selected for its use of critical interdisciplinary enquiry and for its view, quoting Virchow, that "all disease has two causes, one pathological and the other political" (in Green and Labonte 2007, p. xiv). Finally, the journal *Epidemiology and Community Health* was selected for its study of social medicine. This journal has a historical affinity with sociology but has a quantitative and epidemiological orientation, making it a good complement to the more qualitative and critical orientations of the other two journals. Overall, and together, these three journals represent a spectrum of approaches to social studies of health, all of which have different kinds of points of connection with sociological studies of health and illness. The rationale for analysing the entire content published

Journals Reviewed

The journal *Sociology of Health and Illness* is edited by the Foundation for the Sociology of Health and Illness affiliated with the British Sociological Association and published by Wiley-Blackwell. 1426 manuscripts were analysed from 1979, Vol. 1, Issue 1 to 2010, Vol. 32, Issue 7.

Critical Public Health is published by Routledge. 356 issues were analysed from the launch date, 1990, Vol. 1, Issue 1. to 2010, Vol. 20, Issue 4.

The *Journal of Epidemiology and Community Health* is published by the BMJ Publishing Group and associated with the Society for Social Medicine. 976 manuscripts were reviewed starting from 1978, Vol. 32, Issue 1 (the first year the journal was published under its current name, switching from the *British Journal of Prevention and Social Medicine*) through to 2010, Vol. 64, Issue 12.



Figure 4. Scopus SJR Ranking (Scopus 2011)

between January 1978 (or the first edition in 1978) and December 2010 (or the last edition of 2010) was to identify which health and the environment discourses were being developed in each academic milieu and how they were being elaborated upon over time. In total, 2758 manuscripts were examined; the findings of this study are presented in Chapter Four.

A fourth choice could have been the journal *Social Science and Medicine* and I did actually conduct this analysis as well. The material is not included in this thesis, however, because while the articles are more numerous and nuanced in their theoretical engagement with the environment, contributions are by authors from a range of social sciences which meant that analytically it would diffuse the analysis and draw the focus away from sociology. This SSM analysis will be of value for future comparative studies.

Content analysis generates both knowledge and understanding of the phenomenon under study (Graneheim and Lundman 2004) in an unobtrusive way, as the focus is on how words are actually used (Hsieh and Shannon 2005) and what can be construed from these usages. The Content Analysis method was utilised to conduct the journal analyses as it is a family of approaches that facilitates the “systematic examination of text by identifying and grouping themes and coding, classifying and developing categories” (Pope and Mays 1995). The focus of this analysis was how discourses were used to communicate and build meaning within the policy texts and their contexts of

production (McTavish and Pirro 1990; Hsieh and Shannon 2005). The Boolean key words searched for were: earth, planet, nature, environment, biology, climate, weather, air, water, chemicals, environmental health, ecology, ecosystems, and biodiversity. The terms were selected because of their common association with the natural environment. The choice to search for fourteen terms reflected an understanding that social research may not focus centrally on concepts such as the environment or ecology and therefore the goal was to find studies mentioning the natural environment which may more likely occur in relation to specific aspects of the natural environment such as air (air pollution) or water (water contamination). Given the project, this content analysis not only counted incidences of words, a method often referred to by researchers as “a quantitative analysis of qualitative data” (Hsieh and Shannon 2005), but also closely studied how meaning was being constructed, classified and represented within the texts (Kondracki, Wellman and Amundson 2002).

As existing sociological theories and research literature on health and the environment were often limited, the first step was to conduct a conventional content analysis to identify which discourses and terms were addressing these issues, albeit often not in a direct way (Kondracki, Wellman and Amundson 2002; Hsieh and Shannon 2005). From these texts, the most ‘on topic’ articles were selected. For example, all articles that contained the key word ‘environment’ were read and only those that, even cursorily, linked the social world to natural processes were analysed further (Potter and Levine-Donnerstein 1999). When data was valuable but did not fit the existing scheme a new a new coding category or subcategory was created (Hsieh and Shannon 2005). Finally, a summative content analysis of the documents was conducted (see Potter & Levine-Donnerstein, 1999) to ascertain the contextual use of the words (Denzin and Lincoln 1994). Overall I have termed this a ‘cross-disciplinary discourse analysis’ and note that similar approaches have been used in some health studies areas, specifically in the studies looking for specific themes (for example pain) being addressed across a corpus of medical (Rabow et al 2000) or nursing texts (Ferrell et al 1999; Ferrell et al 2000; Kirchhoff, Beckstrand and Anumandla 2003; McEwen 2004).

Data Gathering Through In-depth Interviewing

Chapters Five and Six are based on primary data collected through sixty in-depth semi-structured interviews. It is estimated that approximately “90 per cent of all social science investigations exploit interview data; increasingly the media, human service professionals and social researchers get their information about society via interviews” (Denzin 2001, p. 23). Following on this robust tradition, interviews were conducted with sixty people who are referred to in this thesis as ‘stakeholders’ as they are individuals directly involved in addressing the links between public health and the environment, both in the UK and internationally (see Appendix One). Through these interviews I have sought to understand public health responses to the environment in the UK and identify key stakeholders’ perceptions of the pertinence of environmental determinants of health to their everyday work in the public health field.

Field research

Academic conferences were my site of field work (See Appendix Two). In particular, I was interested in how the natural environment was being constructed within these spaces as relevant to public health. The use of conferences in research is not extensive, although there is some discussion of such an approach in management studies (Lampel and Meyer 2005; Garud 2008), information and communication technology (ICT) studies (Collins, Lynch and Markham 2001), telecommunications (Gunawardena 1995), health research (Sleutel 2001), social studies of science (Knorr-Cetina 1995) and group relations conferences (Lipgar, Bair and Fichtner 2000). It is not, however, a widely reviewed method within sociology and medical sociology, save for a few exceptions (Diamond 2010), although some health work has recognised medical conferences as an important site of “interaction between lab, researchers, clinicians and health advocates” while others regard conferences as sites of “performance, negotiation and knowledge production” (Diamond 2010, p. 12). For the purpose of this research, however, conferences were excellent sites to identify research participants for an interview based study because in these settings it is possible to meet an array of people who have gathered to discuss cutting edge research, test new ideas, network

and nourish existing intellectual enterprises, including furthering the establishment of a new discipline (Ecological Health), creating research groups (for example, ecologically informed studies of newly emerging infectious diseases), and developing new disciplinary frameworks (such as ecological public health). Because my study has also analysed texts, it could be argued that examining conference papers and poster presentations (Hill, Tyson and Jr. 1997) would have made sense. In that conference programmes were used to identify people presenting on public health and the environment issues the task of gathering this documentary data was already underway. Ultimately, however, the choice was taken to interview the authors instead of analyse their texts because the intent guiding this study is to understand why and how people work with the natural environment as a health determinant *and* to gather data about their experiences of working on this topic in the public health sector. Through this focus an understanding of the configuration of present day public health work on health and the environment in the UK has been cultivated, including insights into key challenges arising from these undertakings.

Research participants were recruited at nine conferences, although in the end some conferences did not generate actual interviews but rather contacts and an overview of how the discourses have been developing in different milieu. Conferences were selected because of their thematic focus on public health and the environment or for their special streams focusing on advancing the field of public health and the environment. I gained access to these conferences typically by presenting a paper or poster and in total attended four national public health conferences in the UK and two international conferences in the UK which focused on ecology and health. Internationally, I travelled to ecology and health conferences in Australia and Mexico and was invited to present on health, ecology and ethics in Vietnam. The section that follows considers in more detail the various dimensions of conducting research at conferences.

The research participants

Assembling a comprehensive and diverse research population was achieved through the use of five specific techniques within the Mixed Purposeful Sampling Method (Patton 1990). In total, fifty-five people were recruited at conferences and five people were recruited through snowball sampling when conference delegates deemed them a good fit for this study and I concurred (see Appendix Three for an overview of the research population assembled).

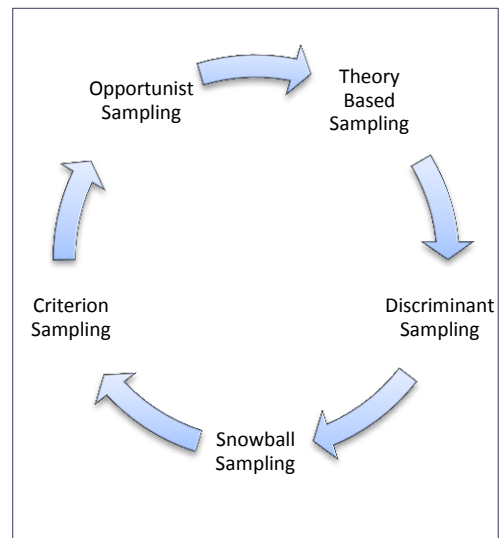


Figure 5. Five Mixed Purposeful Sampling Method Techniques Used

The iterativity of sampling is acknowledged in this method, as the view is that it is not possible to know all the sampling dimensions required until a study is underway—and this was an important point of departure for this study as is described below. First, taking guidance from ‘Theory Based’ or ‘Operational Construct Sampling,’ participants were sought who could help offer an overview of the basic relevance of the environment to public health because they:

- had professional experience in linking health and the environment;
- represented a variety of disciplinary backgrounds found in public health practice; and
- were professionally affiliated with public health practice, for example as employees of a public health organisation.

In other words, these were people who had experienced the possibilities and limitations to linking health and the environment and who could, therefore, speak about how environmental health drivers are being construed within public health settings. Second, using ‘Discriminant Sampling,’ people reflecting a wide range of perspectives were selected (as opposed to assuring a balance in gender or disciplinary training), as perspectives are the focus of my study. I looked, therefore, for a distribution in:

- professional backgrounds;
- positions in organisations (ranging from people working in the laboratory to those in management positions and with significant leadership responsibilities);
- career stages (ranging from early career people to those in late career stages);
- disciplinary training; and
- people working in human, animal, microbial and ecological research areas.

In some cases this balance was not fully achieved. For example, there are fewer people in the international stakeholder group than the other two groups, and there is an unequal representation of early, mid and late career researchers (issues discussed further in Chapter Six).

Third, using ‘Snowball or Chain Sampling’ I recruited from two groups: 1. elites and 2. public health practitioners who felt bounded by issues of confidentiality and who were concerned not to let sensitive information leak into the public sphere. In these cases, interviewees—or those supportive of my study—assured colleagues of my credibility and commitment to confidentiality. Through the mechanism of snowball sampling I came to interview, with great benefit, people not originally imagined as study participants. Largely, my success was because I was able to circumvent gate keepers, which are the structures and/or people that act as ‘access controllers’ (Creswell 2003, p. 184). There are many forms of gatekeeping that researchers, particularly doctoral researchers, have to navigate in order to gain access (and then clearance) to interview, particularly with people who hold positions of power and significant responsibility. Gathering data at conferences as field sites meant that I could develop personal connections through informal face-to-face encounters. The strategy of building contacts at conferences is a technique both formally and informally condoned as an important networking strategy within academic culture. However, actually conducting interviews at conferences, or at least actively recruiting for research participants within these milieu, is less well discussed and even attracts some criticism for this being an intrusion into the ‘sanctity’ of a closed professional context.

Fourth, I used ‘Criterion Sampling’ to organise the research participants into formal ‘stakeholder’ groups (also a first stage of analysis) and began to interview purposefully to further populate these three groups:

- **The Health Protection Agency Group (HPA):** Public health practitioners directly employed by the HPA.
- **The United Kingdom Public Health Group (UK PH):** Public health specialists, researchers, practitioners and people in the wider workforce working on public health issues in the UK and who were also not working for the HPA. This included people working in universities as well as local health authorities, regional public health initiatives and in the field of environmental health. Many of these stakeholders were accessed through the UK PHA and a smaller number identified through conferences where their work on public health and environmental issues was discussed.
- **Public health practitioners and health researchers working outside of the UK (Intl):** The international conferences I attended were the sites at which I recruited this group and included elites working in organisations such as the WHO, the International Association for Ecology and Health (IAEH), the International Human Dimensions Project (IHDP), the WHO Special Programme for Research and Training in Tropical Diseases (TDR) and the United Nations. This third group serves as a point of comparison and contrast for the two UK stakeholder groups.

Fifth, and finally, ‘Opportunist Sampling’ helped fill the gaps wherever possible, particularly in terms of creating a research population which reflected a broad range of approaches to working with natural environmental health determinants.

To evaluate the Purposeful Sampling process, ‘appropriateness’—a measurement of how participants are purposefully chosen in order to meet the theoretical objectives of this study—is useful. Another device is ‘adequacy’, the point of saturation where the data begins to produce reliable insights into the topics being researched (Sandelowski 1995). In this study, the process of assembling a research population and conducting research took approximately three years and did not find saturation until close to sixty interviews. How one selects who is involved in a study, where and how people are interviewed, and the ethics driving the research are all central to the meaning-making processes and deserve due diligence (Green and Thorogood 2010). These are the next issues addressed in this chapter.

Ethical considerations

The ethical guidance for this study is drawn from the statement of ethical practice for the British Sociological Association (BSA 2002) and its utilisation by the then Graduate School of Social Sciences and Cultural Studies Board of Ethics of the University of Sussex (now the Social Sciences Cluster Research Ethics Committee). The professional standards for conducting research with human subjects outlined by the British Sociological Association list a number of criteria to satisfy when gaining voluntary informed consent from participants. A detailed disclosure of the terms of the research interview are outlined in the three page interview package I presented to each research participant in advance of the research and which is provided for this study as Appendix Three. Page one of the package described the terms of participation; page two was a voluntary informed consent form, identical for all three stakeholder groups; and page three included one of three interview schedules developed for this study depending on the stakeholder group with which the interview participant was affiliated. In the case of the first two documents the only thing that was changed was the dates on the form.

Voluntary informed consent was given by all research participants at the onset and conclusion of the interview—particularly a confirmation that all material discussed could be transcribed and in the case of ‘off the record’ comments I assured people this information would not be transcribed. All people interviewed were comfortable with having their interviews transcribed and all were asked if they would like a copy of the digital recording of the interview and/or a transcript for their records, but only 10% of respondents wished to receive a copy. Most people offered to be contacted again and five of the sixty people interviewed said that they would like to see an edited collection of the interviews be produced as they felt that these were important topics and issues that they did not usually have the opportunity to think about in such depth or the chance to spend time speaking about in an uninterrupted space. All but a few asked to be notified when there were publications from this research and to see a copy of the thesis once completed. I committed to notifying them when the thesis was finished as a way of thanking them for their participation.

During my research the only third parties with access to my entire research data were my supervisors. Transcriptionists had access to specific audio recordings. The information obtained from participants during interviews has been kept confidential, and pseudonyms have been used in written material. My research file contains a master list of the participants and their appointed pseudonyms. While I have kept the material anonymous and will continue to do so in the future, a surprising number of people suggested I could use their real name and title. Data gathered is stored on my computer in a password-protected file and on a separate password-protected external hard drive. Physical documents are in a locked filing box in my home office. I have permission to use this data for future publishing.

Interview schedules

As indicated above, three interview schedules were developed for this study, one for each stakeholder group (see Appendix Three). Each schedule contained the same structured opening questions and in the second half included semi-structured questions with follow-up questions tailored to the individual participant group. Developing interview schedules was an iterative process which began at the first two conferences (HPA 2007 and EcoHealth 2007) attended when I tested what became the formal interview schedules. Based on the feedback received, I refined my approach so that by the third conference (COHAB 2008) I had developed a sound interview schedule, successfully conducted fourteen interviews and from there launched the process of assembling the research population for this study. How the interview schedule was used during the interview process continued to evolve and be refined as I accumulated insight into the project and the populations under study. The questions in the first section of the research schedule were *pro forma*; the specialist questions in the second section were more open ended. For example, in the first half of the interview people were asked to describe how the environment figures into their public health work. In the second half I drew upon background research to formulate follow-up questions based on my knowledge of research stakeholder's training, workplace, job description, and issues they had presented at conferences. There were some repetitions in the follow-up questions, as areas of interest remained consistent over

the course of the study; enabling me to gather details about the construction and constraints of the linkages between health and the environment in the workplace of each individual.

Interview settings

Interviews are a specific kind of interaction and the situations in which they are conducted contour the accounts that are offered. In this research, the interviews were conducted in two settings: 1. face-to-face interviews in conference venues and 2. telephone interviews at a location of the person's choice, usually their home or work office.

Questionnaires were also filled out in the latter environments and the time a respondent took reflected whether they considered it a legitimate work task.

Interview Formats

Of the sixty interviews conducted:

- Thirty-two people were interviewed face-to-face
 - Three of the face-to-face interviews were conducted as small two-person groups making a total of six people interviewed in this way.
- Twenty-four were interviewed by telephone
- Four were interviewed by email questionnaire

During conferences where I was actively interviewing people, the 'interview' became part of the fabric of the conference and people were open and comfortable about participating in the study. Ultimately, a few research participants approached me after seeing their colleagues in interview, because they wanted to share their views on the subject. The majority of the interviews were one-to-one, in-depth and semi-structured. In three cases, the interview participants decided to speak with me together because they work closely or had trained together. In two of these three instances this worked well and in a third group tensions arose when the colleagues realised they held significantly divergent views on the subject of health and the environment. Overall, the richness of the face-to-face and telephone interviews was very comparable, perhaps primarily because the majority of telephone interviews were conducted with people with whom I had already established a rapport at a conference or with whom I had been put in contact by a respected colleague. There was less richness in the data provided by three of the four questionnaires; however, the answers provided in one

questionnaire (a telephone interview turned into a questionnaire due to a sudden flu on the scheduled day) was thoughtful and generous—a truly moving text to receive.

In-depth interview dynamics

In-depth interviewing generates thick descriptions or detailed accounts of how a research participant views a particular subject (Green and Thorogood 2010).

Qualitative interviewing is also a complex undertaking, in part because it is a subjective experience and the rapport established between the interviewer and the research participant impacts data collection. Within the intimate context of the interview, interviewer-participant dynamics can come into play. In this section I draw attention to three dynamics relevant to my research: the interviewer effect, the respondent effect, and interviewing elites.

Interviewer effect refers to ways in which the person conducting the interviews impacts the interviewee (Britten 1995; Denzin 2001). Interviewer attitudes, behaviours, expectations, experience, and social location can all impact how an interviewer asks questions, records and measures answers and maintains the respondent's motivation throughout the interview (Blom and Korbmacher 2011). As is customary in doctoral research, I alone conducted all of the interviews and in each interview focused on establishing a similar quality of connection with the stakeholder by opening with a brief discussion about their work, communicating why I was drawn to their particular research and describing at least one concrete reason why their participation in this study was important to me. To further limit the interview effect the first question I asked each stakeholder was to broadly describe how they had become interested in the subject of the environment and health. This personal narrative would sometimes last a quarter of the interview but helped to establish the participant's voice in the interview setting before moving on to my research questions (my agenda). Obviously the interviewer effect cannot be eradicated but by focusing on building rapport I sought to limit my impact.

The respondent effect draws attention to how respondents shape their answers in an effort to try to 'give' a particular interviewer what he or she is imagined to want to hear (Denzin and Lincoln 1994; Denzin 2001). In the case of this research it was explicitly understood that I thought that making the links between health and the environment was important. While this could have led to 'induced bias', participants did not know how and why I thought this was an important issue. Therefore, if asked a question about my own point of view on the subject, I offered a diplomatic yet candid reply that in my view it is important to link issues of health to the environment. In this way I was able to offer some kind of disclosure of personal opinion without conveying a sense of approval or disapproval of the specificities of their actions and attitudes vis-à-vis the interview topics. One issue I did identify, however, was that a small percentage of people used the word 'ecology' and when queried explained that it was not a term they used regularly but they had used it in order to 'speak my language.' Overall, however, people were purposefully selected to participate in the study based on their proven interest in the issues being discussed.

Another type of 'interview effect' pertinent to my research was that of interviewing elites (Conti and O'Neil 2007) which is also a salient issue for health care research in general (Harris et al 2008). As Welch et al. state, "the power of an elite interviewee stems from organizational hierarchy, corporate values and history, personal assets and degree of international exposure" (2002, p. 611). Reviewing the literature, I realised that I had not contended with many of the challenges identified with interviewing elites (Moyser and Wagstaffe 1987; Welch et al 2002). First, the challenge of identifying elites to interview was not one I dealt with, given that I interviewed people in the liminal spaces of conferences or at least established a commitment to conduct an interview at a later date in these contexts. At conferences I also experienced a kind of levelling of the field that occurred or at least a willingness to assist an eager doctoral student within the limits of time, space and availability in a conference setting. Second, the dynamic of differences between interviewer and interviewee in professional values, seniority, gender and culture was another theme identified in the literature (Welch et al 2002). I am certainly marked by privilege as a white, English speaking citizen from the first world; however, my lower status as a female student worked in

my favour as I was there to learn rather than debate and I was eager to gain insights into participant's values and welcoming of their disclosures. The one exception was an interview I conducted with an UN elite person who limited the meeting to fourteen minutes. During that time his mobile rang several times, and he occasionally answered it. Yet, this senior official did make commitments to me during the interview and followed up on them without prompt. Overall, the gaps between the elite interviewees and myself opened up space for communication and information exchange perhaps in part because I was absent from the frameworks of power within which they work and I had no recourse to entry into these places. In short, I posed no threat. As is also observed in the literature, each elite interview context requires different kinds of tools for navigating the power differential effectively. I found that my best strategy was to emphasise the specialised requirements of my study in order to underscore the importance of a high calibre discussion of the subject (Berry 2002, p. 679).

Critical Discourse Analysis of Interview Data

Discourse analysis refers to the study of language use and is conducted through a variety of techniques. Critical discourse analysis (CDA) offers a particular perspective within this approach, based on critical theories of power and discourse (van Dijk 2003; Hodges, Kuper and Reeves 2008). As van Dijk observes there are many variations of CDA, but crucial to all forms "is the explicit awareness of the role of discourses in society ... as they are inherently part of and influenced by social structure, and produced in social interaction", underscoring the importance of studying these relations (van Dijk 2003, p. 352). Rather than a strict adherence to CDA, this doctoral study has focused on empirical discourse analysis, which "looks for broad themes and functions of language in action" (see Hodges, 2008, p. 337). I have, however, used the basic tenets of CDA as a guide:

- CDA addresses social problems;
- power relations are discursive;
- discourse constitutes society and culture;
- discourse does ideological work;
- discourse is historical;
- the link between text and society is mediated;

- discourse analysis is interpretative and explanatory; and
- discourse is a form of social action. (van Dijk 2003)

A poststructural approach to discourse analysis informed by theories of power (Gislason 2010) has also been utilised, in particular because I wanted to focus on the productivity of power relations. CDA is criticised for focusing more on the production of issues of knowledge and ideology as related to the social without also looking at the work they do within these social structures. I have tried, therefore, to link 'discourse and action' with 'cognition and society' (van Dijk, 2003, p. 363). Analysing a broad range of historical and current texts, including policy texts which highlight the levels of governance involved and the ways they link the local to the global, allowed me to link my study of discourses to the production of the social and to how the health of the public is produced within these social structures. I have also endeavoured to link current environmental public health problems to individual beliefs and social issues.

Transcription

Transcription facilitates the move from data gathering to the analysis of interview data and is "a translation process in itself" (Green and Thorogood 2010, p. 117). In this study the transcription focused on presenting the talk and not punctuation and inflection. Of the sixty interviews conducted (with four respondents providing questionnaires) fifty-five were transcribed and in one case (where my recording software malfunctioned) only my interview notes were analysed. Across the board, the criteria for transcription were the same (see boxed item). Although I proofed all transcripts by listening to the audio file and correcting errors in the Word documents and

Criteria for Transcription

- Audio tapes to be transcribed verbatim.
- Personal markers to be left in the transcripts.
- Transcripts to be proofread for accuracy.
- Laughter, pauses, repeated words and other habits of speech to be included but lengths of pauses, shifts in tone of voice and other transcription notations required for a close reading of the speakers not required.
- Inaudible or undecipherable passages to be indicated with time code marking the beginning and end of the passage.
- Full payment to be based on a 95% or better accuracy rate.

improved accuracy to near 100% (unless a section of the recording was inaudible), two additional people transcribed the interviews. Edward Isaacs at Intealeants transcribed fifty making for a high level of consistency in the transcription process; UK Transcription transcribed three; and I transcribed two interviews. Each of the transcriptionists signed a confidentiality agreement. UK Transcription destroyed the voice files and the Word documents produced once the files were sent to me. Intealeants maintains password-protected files.

Coding and analysis

NVivo is a qualitative analytical tool and is organised around the principle of coding according to themes. While the approach is familiar to the qualitative researcher, NVivo vernacular is unique as it refers to key themes as 'tree nodes' and sub-themes as 'child nodes.' In my research I created eleven Tree Nodes and 208 child nodes. The small number of tree nodes was an analytical strategy to keep me focused and four of these nodes were methodological, not conceptual destinations for my data. See the figure below for an overview of the number of times the data was coded at the eleven tree nodes as an illustration of the distribution of analysis between the key themes:

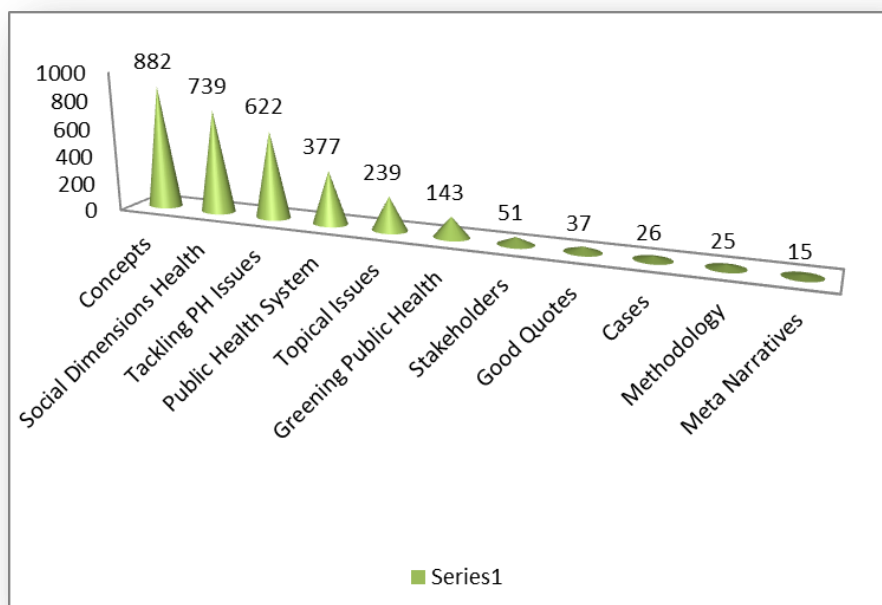


Figure 6. Distribution of thesis coding across the eleven key analytical themes

Developing the codes was an iterative process that began with identifying the obvious key concepts of the environment, public health and the social. Over time the themes were given dimension by sub-themes. For example, under the tree node 'environment' I created child nodes such as air, water, and chemicals which also reflected the key words I used to conduct my journal analysis. I also created the category of ecology, as many environmental health drivers were identified to be ecological processes. I added the concept of biodiversity after attending a conference on biodiversity and health and added the related concepts of sustainability, resilience, holism and interdependence thereafter. In the end, there were eleven tree nodes around which I organised my analysis:

Public Health System: operationalised the UK public health sector and drew specific attention to the ways in which governance mandates, policy formation processes, and the structuring of various public health organisations impacts the construction and contestation of the natural environment as relevant to public health. This node became a theme running through my work.

Greening Public Health: gathered all information pertaining to environmental or ecological health discourses, theories or practice as described in interview. Examples of this included information coded at terms such as environmental health, environmental public health, ecological public health, EcoHealth, EcoBioSocial, One Health, and Health for All. This node also became a theme running through my work, ultimately emerging at the end of the thesis as an important way forward in public health.

Social Dimension of Health: included references to the social, including to the public, economics, politics, policy and health inequalities—all considered aspects of the social. This node has shaped much of Chapter Six.

Tackling Public Health Issues: addressed how individual public health practitioners conveyed their everyday experiences of working at the interface between health and the environment. The sub-nodes I developed made conceptual connections, identified problematics and disciplinary frameworks, and looked at activities such as interdisciplinary initiatives, cross agency collaboration, the allocation of resources, and the differences between formal projects and individual initiatives. These nodes helped me study how people were actually going about working on these issues and the kinds of forces they encountered in their work.

Concepts: became an important category particularly useful for matrix coding as it contained all the key words and key concepts people were working with, such as interconnection, interdependence, and complexity.

Topical Issues: Listed all the environmental health issues that people were working on and produced a huge category which reflected a widespread engagement but had small numbers of participants associated with each one, with the exception of infectious diseases, rendering it of little analytical value.

Stakeholders: included different stakeholders discussed in interview such as patient groups, citizens, the civic sphere, and lay epidemiologists. Over the course of the study, though, I realised that my interview data were not sufficient to support an analysis of the engagement of the public with the issues and it was included only as a sub-theme in my analysis.

Case studies: is where I coded sections of text I valued for the narrative they told. I have placed some of the material coded to this node as 'interview excerpts' in my thesis.

Good quotes: is a self-explanatory category but enabled me to capture important text and, knowing that it was accounted for, to continue to be discriminant in my overall coding approach.

Metanarratives: was used to code for those ideas which were used frequently and which described an overarching ideological framework or commonly accepted discourse

Methodology: is where I gathered any material on methodological approaches, challenges, and feedback about my research project or reflexive comments made by research participants about their own work or the work of others in the field.

In that my goal has been to bring my desk research into conversation with my primary data, the key analytical themes in my discourse analysis have not been directly translated as the chapters for my thesis but have significantly impacted the frameworks through which I have read the various data together. As I discuss in the final chapters, an overarching framework for this thesis turns out to be complexity and a method for understanding it systems theory.

Reflections on the Research Process

Reflexivity, an essential aspect of qualitative research, takes the form of reflecting critically on the research itself as well as on the role of the researcher in generating and analysing the data (Green and Thorogood, 2009, pp. 23-5). One refrain in my doctoral journey has been the question "how am I functioning as a sociologist?"

My work in this thesis can read as a 'committed campaign' and as a key issue I have had to ensure that my work is 'sociological enough.' The latter issue is a result of my observation that generally sociology does not have sufficient theoretical or methodological tools to expand thinking about the social's interaction with the natural world, particularly as it relates to health and medical sociology's study of health phenomena. I have endeavoured, therefore, to work interdisciplinarily and within this to make a double movement by studying public health through critical social theory and at the same time reflecting critically on sociological frameworks. In the end, more than conducting a sociological analysis I have tried to conduct an analysis of the social. I have used the conceptual tools offered by other disciplines that work actively on health at the nexus between the social and the environmental to support my movements through social theory. I have, however, also used social theory to mediate the seduction to embrace fully the certainty of the biomedical gaze when working with the health sciences as a sociologist.

There are also limits to this study, of course. Overall, the technique of content analysis has been criticized for its inability to identify and communicate the broader meanings present in the data. To counteract this limitation, I used a predetermined set of key words to create internal consistency between analyses (Stemler 2001) and checked the articles analysed to ensure that the intended meaning of the words was reflected in my investigation (Heath 1997). This study's reliance on academic publications is another limitation as academic journals do not always reflect the full spectrum of an academic community's engagement with a topic (Abraham 2009). For example, during the 1980s and 1990s when sociologists in the UK were concerned about the environment they focused their attention on direct, applied actions as opposed to publishing (Abraham 2009). Abraham also suggested that overall medical sociologists were not as engaged in addressing the environmental concerns of the day and there is a legitimate lacuna in the literature on health and the environment. Cognisant that these dynamics have impacted the structure and content of the academic canon, I view journals as worthy, albeit incomplete, makers of academic engagement. Academic journals retain their merit as mediums through which intellectual communities demarcate and develop the theories, methods and frameworks of their

respective 'disciplinary worlds' (Brew 2008; Castán Broto, Gislason and Ehlers 2009). As some argue, disciplinary learning on a topic can be evaluated with some accuracy based on content analyses of textual communications (Morse and Field 1995; Hsieh and Shannon 2005). Finally, I stand humbled as a student as I have gathered more data than can be reasonably condensed and communicated in a doctoral thesis. There are also myriad NVivo codes which have rich data coded at them and warrant articulation—in part because they were important stories to the people who told them—but find no home in this write-up. I hope to honour these stories through future writing and research projects.

Conclusion

This study represents a novel approach within medical sociology and even within public health. It is the product of an iterative research approach to studying health at the nexus between the social and natural. Verification is different in qualitative research than in quantitative research as it measures things such as the trustworthiness of the research design and the findings. In my effort to be 'trustworthy' as a researcher I have been guided by five qualitative research principles: relevance, consistency, credibility, generalisability and methodological pluralism (triangulation).

Relevance is a tool for evaluating the merits of qualitative research (Malterud 2001). The first chapter can be evaluated for how it sets out the argument for the importance of this research at this particular moment and time. In terms of reliability, the material laid out in this methodology chapter and the supporting material in the appendices enables others to track how I developed and modified this research. Internal validity, which refers to the credibility or the truth value I have achieved, is a difficult assessment to make within the context of qualitative research which is explicitly subjective. I have endeavoured to explore participants' experiences in sufficient detail in data chapters Five and Six and through the inclusion of 'interview excerpts' hoped to allow unedited chunks of text to speak alongside my own analysis, which has intentionally been interpretive. Clearly, I am informed by post-positivist approaches to

data analysis and therefore one of my responsibilities is to critically discuss and interpret the data so that the research process I am engaging in is about both reporting and producing knowledge critically. Finally, the issue of internal validity has been addressed through using multiple sources of data (triangulation). The material presented in this thesis is based on sixty in-depth interviews which on average lasted between forty-five minutes and one hour and which were conducted with people from all over the world. I have reviewed 2758 journal articles as data for my literature review/desk research (Chapter Four), also documented in the appendices. I have also analysed public health acts (in the UK) and the elaboration of the policy arena of environmental health in the UK and Europe (Chapter Three) which is also part of a contribution I made to a policy paper in the journal *Public Health* (see: Stassen, Gislason and Leroy 2010).

The chapters that follow present the documentary and interview data described above. Attention is given first to the extensive and systematic desk research of the public health sector and the elaboration of environmental health governance into a formal policy arena in the UK (Chapter Three), which also serves as a justification for a closer study of the links between the environment and health within the empirical site of the UK public health system which is presented in the chapters that follow.

Chapter Three

The UK Public Health System and the Environment

Observations of the congruence between the state of public health and the state of the environment and the complex challenge environmental health drivers pose to public health, most of them linked to environmental degradation, opened this thesis. Drawing from desk research on public health organisational structures and analysing environmental public health policy, this chapter delves into the structural dimensions of the public health sector in the UK in order to understand the formal structures within which this correspondence is addressed. The data in this chapter also serves as a framework through which to read the next two chapters which investigate how public health specialists, practitioners and those working in the wider public health arena construct and contest the relevance of natural environmental health determinants to their public health remits.

The UK Public Health System

Public Health takes a positive view of health by preventing ill-health and promoting wellbeing through “what our society does collectively to assure the conditions in which people can be healthy” (CHD and HCWH 2006). A definition given in the 1920s is still referenced today:

Public Health is the science and art of preventing disease, prolonging life and promoting health through the organized community efforts for the sanitation of the environment, the control of community infections, the education of the individual in principles of personal hygiene, the organisation of medical and nursing services for the early diagnosis and preventative treatment of disease, and the development of social machinery which will ensure to every individual in the community a standard of living adequate for the maintenance of health. (Winslow 1920, p. 23)

Drawing on “the spirit of the early pioneers in public health [above] but within the context of the new health challenges” a ‘new public health movement’ (Hunter et. al., 2010, p. 50) beginning in the late 1970s added to the focus on primary care and treating illness the priority of prevention. Improving population health, for example through better nutrition and healthier environments, was tackled within “the interplay

between health and social and environmental factors” and with an emphasis on “the role of public policy, intersectoral collaboration and community action” in improving health (Hunter et. al., 2010, p. 51). Attention to equity and the impact of socio-environmental settings was central to this effort to transform the existing ‘national sickness service’ to a ‘national health service’(Wanless 2004).

Over time, the vision of improving the health services has not waned but the holistic view of health in community and health and the environment has shifted back to a focus on individuals and to administrative preoccupations such as creating health systems that facilitate making healthy lifestyle choices (Secretary of State for Health 2004). The latest trend is to develop a multidisciplinary public health system where ‘building capacity’ means adding to existing medical expertise the proficiency of disciplines practised in engendering community involvement and empowerment and finding ways to value their contributions alongside the clinical care remit (Evans and Dowling 2002; Hunter, Marks and Smith 2010). However, the challenge of finding the balance between public health and primary care and between local, regional and national divisions of responsibility is still present (Hunter, Marks and Smith, 2010, p. 54). One of the reasons is structural, in that due to its affiliation with the NHS, public health is ‘too close to health care and too far from health’ because of being embedded in the ‘national sickness service’ (Hunter, Marks and Smith, 2010, p. 55). Economics also play a part in that NHS resources tend to be directed to the health services which are defined as “demand led” and even redirected from public health in times of need because this service is deemed to be “policy led” (Hunter, Marks and Smith, 2010, p. 55). Certainly, finding a balance between the medical model of primary care and organisations and community based approaches is important as to do this also requires finding a balance between treatment and prevention and between short-term versus long-term frameworks for health care interventions and health promotion.

Not all would agree, however, with the notion that public health is less essential than clinical practice given the three broad (and intersecting) domains of public health practice: health improvement, improving services and health protection. Health improvements address health inequalities through health promoting activities such as

education, behaviour and lifestyle choices, as well as through material community interventions such as improving people's access to education, healthy housing, and employment. Public health governance strategies set standards of evidence-based clinical effectiveness and efficiency assessments and, along with service planning, audits and evaluation strategies, are ways in which the public health sector improves services and supports clinical governance. Health protection works on protecting people from specific threats and includes immunisations, vaccinations, screening, the control of infectious diseases, emergency planning and injury prevention (Hunter, Marks and Smith 2010, pp. 6-7). These complex and highly politicised debates around treatment versus prevention are occurring within a health care system that is regularly reviewed and reorganised. The 2010 White Paper 'Equity and excellence: Liberating the NHS' is the most recent reorganization proposal (DoH 2010a) to significantly restructure the composition of the health sector, although ring-fencing public health.

Presently, responsibility for the three arenas of public health practice fall broadly under the remit of the Department of Health (DoH) and the National Health Service (NHS) which are configured slightly differently in England, Wales, Scotland and Northern Ireland. The NHS works in partnership with local government, the 'third sector' and businesses at local through national levels, roughly organised under the frameworks of healthy public policy and community empowerment. At the local level, directors of public health (DsPH), increasingly joint appointments between the NHS and local government, are located in Primary Care Trusts (PCTs) and are responsible for the public health remit. Strategic Health Authorities (SHAs) and the PCTs (which replaced the health authorities and NHS regional executive offices by 2002), are NHS organisations which engage in a variety of public health activities such as gathering surveillance data, participating in community planning, and generating annual reports on population health.

Three broad categories of people comprise the public health workforce. The 'wider public health' is the largest group, but as they are employed as teachers, town planners or social workers and the like, their work to help improve health remains outside of any formal structures. A smaller group of professionals are 'public health

practitioners' employed as environmental health officers or health visitors, with the smallest group being specialties employed by the NHS. The workforce, therefore, is located across a wide-ranging public health system, is trained in different disciplinary backgrounds, and is responsible for different remits and scales (ranging from the local to the national).

Another issue is the role of the third sector within the public health workforce. NGOs, including both national voluntary organisations and community groups and international bodies like the WHO, play a significant role in public health work in a variety of ways, ranging from "devising and accrediting competencies and skill sets to lobbying for changes in policy and practice," yet their work often remains largely undocumented and outside of the formal NHS structure which is the seat of health funding (Hunter, Marks and Smith, 2010, pp. 89-90). Increasingly, the UK public health service is also embracing domains not traditionally considered public health if they are deemed to have health consequences (and should therefore be included in 'healthy public policy'). Multiple and intersecting public health determinants are also being considered, as capacity building across a range of sectors within the public health is increasingly the demand (IOM 2003). As Connelly and Worth note, "the history of public health in the UK is largely the history of changing ideas about how disease is caused and what can be done to reduce it and improve health" (1997, p. 1). This does not leave the system exempt, however, from being impacted by "varied and on-going power struggles and turf wars" which in turn produce "professional and sectorial barriers that ... disable effective and coordinated public health activity (Hunter, Marks and Smith 2010, pp. 8-12).

A systems analysis shows that the public health system in the UK is "a complex network of individuals and organizations that have the potential to play critical roles in creating the conditions for health" and is often a "chaotic, sprawling, dynamic set of practices which are often intensely political" (Hunter, Marks and Smith 2010, p. 3). Concretising what this exactly means turns out to be a fluid process, kept in constant motion by fluctuations in the kinds of demands placed on the public health service. Increasingly public health is conceived as a system promoting collective action and it is

acknowledged that individuals through to organisations and governments shape what happens in the system. One of the latest tests for the sprawling UK public health system and its highly politicised structure is the environment, which is also true for public health systems across the world. Even so, the interdependence between health and environmental degradation has not yet “caught the public mood to the extent necessary to bring about an urgent political commitment to change” (Hunter, Marks and Smith, 2010, p. 150).

The activities addressing the links between human and environmental health in the UK are reflected in two general approaches embodied to some degree by the divergent styles of the Health Protection Agency (HPA) and the UK Public Health Association (UK PHA) (Hunter, Marks and Smith 2010, p. 150). The Health Protection Agency (HPA) is a relatively new addition to the UK public health sector. Established in 2003 and formalised in 2004 through the Health Protection Act and as an Executive Non-Departmental Public Body (NDPB) in 2005, the HPA is a stand-alone national Arms Length Body (ALB) sponsored by, and accountable to, the Department of Health (HPA 2011a). The HPA replaces the earlier HPA Special Health Authority (SpHA) and the National Radiological Protection Board (NRPB) and is responsible for infectious diseases, chemical hazards, poisons and radiation, with the microbiology services still being its largest division. Recently, the HPA has been organised into four groups: 1. Microbiology Services, 2. Health Protection Services, 3. Biological Standards and Control, and 4. the Centre for Radiation, Chemical and Environmental Hazards (DoH 2010b). Through a Memorandum of Understanding and service level agreements, the HPA’s specialist centres also offer support to their local PCTs (HPA 2011a). The mandate of the HPA is broad:

as an independent specialist organisation dedicated to protecting the health of the population of the United Kingdom, the HPA provides impartial advice and authoritative information on health protection issues to the public, to health professionals and to government. Everything we do is based on expert skills and knowledge applied to strong front-line services. We work at international, national, regional and local levels to identify new threats to health, to prepare for them, prevent them where possible, and should they arrive, reduce their impact on public health. (HPA 2011a)

Generally, the HPA serves as an independent source of expert advice on environmental public health issues, and “through informing policy and legislation development the agency helps to protect people from environmental hazards such as contaminated land, air or water pollution as well as considering the impacts of climate change on public health” (HPA 2011b). Working closely with the Veterinary Laboratory Agency, the Food Standards Agency, the Environment Agency, Local Authorities, the Department of Health, the Department for Environment Food and Rural Affairs, and the Welsh Assembly Government the HPA seeks to “to ensure that the health of the public is protected as far as possible against any existing and potential environmental threats”(HPA 2011b). The seven primary areas of activity are air, land contamination, water, waste, environmental and public health legislation, environmental sampling, and noise. The HPA’s centre on environmental health and protection is in Colindale (HPA 2011a) and

undertakes investigations of food, water, and vector borne infections as well as monitoring of the microbiological quality of foods, food ingredients and water (recreational and drinking). Aerobiology and equipment (e.g. hospital equipment, water cooling towers) and expert analysis for infection risk and prevention is also provided. (HPA 2011c)

The areas of environmental focus within the HPA reflect the disciplinary expertise of the workforce as well as the institutional history of the organisation which, as stated above, is the product of a merger between specialist health authorities and National Radiological Protection Board and an elaboration on its expertise in microbiology and chemicals. Developing an environmental health remit is occurring in tandem with the growth of the organisation, which has already grown significantly since its inception less than a decade ago.

The recent assemblage of the UK Public Health Association (UKPHA) from a variety of other public health organisations means that it shares challenges similar to the HPA in terms of defining a guiding mandate, formalising its structures and coordinating efforts across the dispersed workforce and organisations that are its members.

Assembled in 1999 through the merging of the Public Health Alliance (PHA), the Association for Public Health (APH) and the Public Health Trust (PHT) (a charitable arm of the PHA) (Hunter et. al., 2010, p. 90), the aim of the UKPHA is to “unite the public

health movement in the UK” and become the “voice of the public health movement in the UK with strong European and world-wide links” (UKPHA, 2011). Unlike the HPA, which is a stand-alone body accountable to the Department of Health, the UK PHA is an independent voluntary organisation accountable to its membership and also driven by it, which may explain why it fosters a more activist agenda:

UKPHA is a unifying and powerful voice for the public’s health and well being in the UK, focusing on the need to eliminate inequalities in health, promote sustainable development and combat anti-health forces ... We seek to promote the development of healthy public policy at all levels of government and across all sectors. We act as an information platform and aim to support those working in public health both professionally and in a voluntary capacity. (UKPHA 2011)

The UKPHA is organised around cross-cutting public issues which bring together its membership of individuals and organisations to work on key areas of inequality in society, such as housing, child public health, violence or mental health, as well as areas needing awareness raising such as the environment and climate change. With promoting social change at its core, the UKPHA extensively defines public health and has as one of its six core organisational beliefs the importance of addressing “the root causes of illness and disease, including the interacting social, environmental, biological and psychological dimensions, as well as the provision of effective health services” (UKPHA, 2011). Correspondingly, one of its special interest groups (SIG) is ‘Health and Sustainable Environments’ which works for:

1. Equity of access: to green space and renewable energy; a safe environment; mobility and transport; clean, safe land and water; and flood-proof neighbourhoods.
2. Community-based provision of space to grow food, minimum waste and efficient recycling.
3. Biodiversity.
4. Changes in agricultural practices.
5. A political framework to protect health and an audit of the health impacts of environments; better planning with thought to sustainability and health; and better planned responses to emergencies.

The environmental health remit being developed in the UKPHA reflects the existing projects and areas of expertise of its members, with the UKPHA not only benefiting in this way but also helping to foster partnerships, initiatives and methodologies that may not otherwise be funded. Despite its mandate and concerted efforts, however,

the UKPHA is sometimes considered a fringe organisation and at other times is limited by its lack of recourse to the formal health system and decision-making channels, making its work on the environment also difficult to integrate fully into the UK public health system.

In the follow section I take a historical look at how the natural environment has been written in and through the public health function through public health policy and governance mandates and use this analysis to evaluate what the formal expectations could be of the public health sector vis-à-vis environmental health practice in the UK (Ball 2006). Opting to begin this policy analysis with a look at historical documents reflects the perspective that when studying complex issues “the present state of affairs can only be understood in terms of the past” (Lee 1997, p. 16). The public health acts of the Victorian era are, therefore, the first to be considered and the last pertain to the (post)modern (multidisciplinary) public health era (Acheson 1998). Overall, as this next section will show, an *ad hoc* approach to environmental health policy formation began in the 1800s and continued until 1989. An agenda setting era runs from 1990 until 1999 and in 2000 an era of absorption and integration arises—one where environmental health policies are being enmeshed with broader policy contexts in the UK, particularly those pertaining to sustainable development (Stassen, Gislason and Leroy 2010).

UK Environmental Health Policy Domain

Discursive institutionalism is a method for analysing the role of ideas and discourses in politics which focuses on institutional change (Schmidt 2008). It is useful for analysing the policy formation processes and how these same discourses are carried forward into budgets, the demarcation of responsibility, and definitions of competencies, and broadly define the rules of the game as they are socially constitutive (Stassen, Gislason and Leroy 2010). The Policy Arrangement Approach (PAA) (Leroy and Arts 2006) is a method which brings together the insights of discursive institutionalism with the reality of multilevel governance (MLG) in relation to the policy formation arena of the UK. MLG, in turn, is defined as “a negotiation between nested governmental

institutions at several levels (supranational, national, regional and local) on the one hand, and private actors (NGOs, producers, consumers, etc.) on the other” (Leroy & Arts, 2006). The PAA uses the interwoven dimensions of actors and coalitions, resources and power, rules of the game and discourses to study how a policy domain or a certain policy level (or levels) become stabilised (albeit temporarily) (Leroy and Arts 2006) and in this case has been applied to the study of environmental health policy formation in the UK.

One of the first references to the links between the health of populations and the environment was by Edwin Chadwick, who in 1842 observed:

Disease, wherever its attacks are frequent, is always found in connexion with the physical circumstances above specified, and that where those circumstances are removed by drainage, proper cleansing, better ventilation, and other means of diminishing atmospheric impurity, the frequency and intensity of such disease is abated; and where the removal of the noxious agencies appears to be complete, such disease almost entirely disappears. (Chadwick 1842)

The picture painted by Chadwick and other early scholars such as Engels and Virchow was that the health of the public, socio-political activities and environmental conditions are interconnected. Their research was convincing enough that in the UK the 1848 Public Health Act, which elaborated on the Poor Law Commission of 1842 (Slack 1999), was drawn up in order to address the social drivers of disease, which were made visible because of the ways their activities were impacting the environment. Part of this initiative was to give ‘teeth’ to new governance structures by giving Boards of Health the power to improve infrastructure such as “water supplies, drainage and sanitation with the aim of improving public health” (Capleton, Stevens and Harrison 2005, p. 546). Soon after, London’s cholera epidemic famously mapped by John Snow in 1854, enabling him to discover that the source was the Broad Street water pump in Soho, reinforced the notion that social activity and disease emergencies can be significantly interlinked within the environment and so should be their solutions. In terms of Public Health governance, however, it was not until the 1909 Town Planning Act, followed by the Housing Acts of 1919 and 1930, that public health policy recognised that not only do social and economic contexts affect health

(a historical way of defining the environment within public health contexts) but so too does the built environment. It was not until the UK's Public Health Acts of 1936, 1961 and 1967 that the environmental determinants of health were defined not simply as the human built environment but also as pertaining to natural ecological systems. This was also a time when acts addressing animal health and agricultural and food safety were being developed, albeit outside of the public health arena. Similarly, clean air and transportation acts, many of which build on earlier public health, healthy building, pollution, chemical hazards, and water acts, were also being developed to address the links between environmental conditions and human health impacts. Together, these policy developments meant that over a span of approximately thirty years the environment was brought back, albeit in a piecemeal fashion, into the loosely structured public health framework in the UK.

In 1948 the National Health Service (NHS) was established. Since that time its responsibilities, remit and structures have gone through many incarnations but what has remained constant has been a national commitment to improving the health and wellbeing of the population. With each significant shift made the services addressing environmental health were restructured and the resources and prestige granted these domains demoted. Particularly noteworthy for environmental health was the 1974 reorganisation of the NHS into a series of new health authorities which involved reallocating health care responsibilities, such as taking the delivery of the health system out of the preserve of local governments (Williamson 1996, p. 3) and forming new health authorities. For many these moves illustrate that public health continues to be "a narrow medical speciality that merely 'pretends' to adopt, or gives the semblance of adopting, an inclusive approach to wider concerns" (Hunter, Marks and Smith 2010, p. 2).

While for the public health sector generally this was a generative period for environmental public health the deleterious impacts of the restructuring of the NHS during this era continue to be felt today, in particular because of the disassociation of environmental health issues from the broader public health remit. For example, this move entailed placing medical officers, still responsible for communicable diseases, in

the new health authorities whereas specialist Environmental Health Officers (EHOs) and Area Medical Officers (AMOs) were retained in the local authorities but “relinquished their former involvement in housing, roads, leisure and even education, with some relief” and increasingly become focused on interfacing with the NHS (Williamson 1996, p. 3). These shifts led to both an organisational and a geographical separation between medical officers and environmental health officers and an ideological division between the two areas of specialism and practice in the UK (Williamson 1996). This meant that focused medical work was taken up within the context of the new health authorities whereas attention to the overall health picture of an area and the environmental issues of that area were kept at a local level. To further confuse matters, prevention was still the remit of the health sector. Therefore, while the NHS was establishing health promotion units, so too were local authorities, which remained independent of the NHS and of any affiliated public health initiatives they were developing (Williamson, 1996, p. 3). In the UK this created a lack of clarity about where the responsibility for health and the environment would be placed. This gap has not been entirely bridged and until recently it was generally agreed that issues relating to health and the environment were not a national but rather a regional concern. Not surprisingly, this lack of clarity has impacted the development of environmental health programmes and initiatives in the UK under the purview of public health.

While interest in the environment seemed to be receding from the remit of the NHS, the links between human and environmental health were gaining attention within local government in the UK and within popular culture more generally. The 1960s and 1970s were defined by the emergence of a variety of social movements in the Western World. Arenas that inspired particular widespread social actions included racism, sexism and the environment. In the UK between the 1960s and the 1980s community organisations came to play an important part in making the links between health and the environment. Although working outside of formal organisations, these stakeholder groups identified important environmentally driven health-threatening hazards (ranging from toxic waste dumps, pesticide spraying, to air and water pollution) and sought ways to correct the specific hazards facing their communities (Freudenberg

1984). Over time, this work was legitimised in part by international players at the European level, such as the European Commission and WHO-Europe, enabling some of these organisations to work in cooperation with initiatives such as the UN Environment Programme and the UN Economic Commission for Europe. As both Capleton et al. (2005) and Kleinjans et al. (2003) note in their studies on the stakeholders involved in the UK environmental health movement, the actors in the environmental policy field include academia, business/industry, environment ministries, health ministries, local authorities, the media, non-governmental organisations (NGOs) and professional organisations. Other agents include parliamentary groups, such as the one proposed by the Chartered Institute of Environmental (CIEH) (see CIEH, 2011). On the local level, agents have included environmental health practitioners (EHPs) who worked in conjunction with other public health professionals, such as doctors and community nurses active at both local and national levels (CIEH 2011).

A more widespread engagement of the UK health community with issues pertaining to the environment began in the 1970s when environmental issues started to gain attention in the international arena. In 1972, The Declaration of the United Nations Conference on the Human Environment was produced. It stated that the environment was “essential to humans’ well-being” and made the links between ecological problems such as pollution and the detrimental impact environmental disturbances can have on the physical, mental and social health of humans. Out of this declaration, the notion of sustainable development was popularised. This concept emphasised the interrelationship of human activities and their impacts on the biosphere, and thus the interdependence of human beings and the environment. Key works that brought this concept into the public sphere more generally included *Silent Spring* (Carson 1962), *Tragedy of the Commons* (Hardin 1968), *The Blueprint for Survival* (Goldsmith et al 1972), and the Club of Rome’s *Limits to Growth* report (Meadows et al 1972).

By 1978 the first International Conference on Primary Health Care, Alma-Ata, had been held. This conference led not only to the development of the six WHO Health Promotion Conferences that were to follow and which significantly impacted the shape of international health promotion over the course of the next three decades, it was also a meeting where health promotion itself was recognised to be a defining

dimension of public health responsibility. The Alma Ata Declaration laid out the 'health field concept' which promoted a 'look beyond biology' when explaining disease and specifically highlighted four interdependent fields that were deemed responsible for determining an individual's health: 1. the environment, 2. lifestyle, 3. biomedical factors and 4. healthcare services (Lalonde 1981).

The conference that built on the Alma-Ata Declaration was the first International Conference on Health Promotion held in 1986, which produced the Ottawa Charter for action to achieve *Health for All* by the year 2000 and beyond. The WHO positions this conference in the history of public health as

primarily a response to growing expectations for a new public health movement around the world ... It built on the progress made through the Declaration on Primary Health Care at Alma-Ata, the World Health Organization's Targets for Health for All document, and the recent debate at the World Health Assembly on intersectoral action for health. (WHO 2011c)

This approach was spearheaded by Canadian Health Minister Marc Lalonde and had the goal of applying the 'Health for All' principles of equity, empowerment and intersectorality to health care systems and strengthening the importance of public health action. Asserting that health promotion is not only the responsibility of the health sector but also other sectors as well as individuals and communities the Ottawa Charter represented a revolutionary approach (WHO Secretariat 2005) that shaped both discourse and practice all over the world.

The Ottawa Charter played a central role in casting the ideals of a new public health movement by setting out a *salutogenic* view on health where the ethos was that health professionals should function as advocates, enablers and mediators working to build people's health potential over their life course (WHO/HPR/HEP 1986). The Ottawa Charter (1986) claimed that health is created in the context of everyday life: where people live, love, work, learn and play (more recently this definition has been expanded to include where people also Google, travel, and shop) (Kickbusch 2009). The Ottawa Charter marked a significant departure from dominant health education models focused on the individual, because it was an embrace of a more holistic and inclusive approach to addressing a complex array of health determinants (Nutbeam

2008). Identifying and tackling key determinants of health through programmes and information campaigns designed to modify “human behaviours [in order] to reduce those known to affect adversely the ability to resist disease or injury-inducing factors, thereby eliminating exposures to harmful factors” (Turnock 2007, p. 50) was a central focus of this new approach. The notion of health equity—values that reflect the widespread social justice movements of the time—also became central to this new expression of public health promotion.

The Ottawa Charter also influenced health policy more generally. Addressing the determinants of health came to be understood as a process that necessitated the involvement of a number of sectors not formerly included within the public health arena in order to meet these widespread health goals (Petersen and Lupton 1996). As the WHO has acknowledged, initiatives based on health promotion, like healthy cities, villages, communities, islands and regions, health promoting schools, workplaces and hospitals, healthy market place, healthy universities, healthy prisons and others, “have spread the health promotion approach effectively in both developing and developed countries” (WHO Secretariat 2005). This widespread approach implied that if an issue significantly impacts the health and wellbeing of the population, it requires public health attention. Furthermore, this approach anticipated that social change would be required in order to alter specific societal practices that cause injury to health.

By the 1980s, an acknowledgement of the links between the social and the ecological was also being expressed within a new policy and practice domain, Environmental Health. In 1989, WHO-Europe initiated the environment and health process in an effort to address some of the most significant health threats that seemed to link environmental activity with human health injuries. As a cornerstone action, the Environment and Health Process for Europe (EHPE) was launched by WHO-Europe in 1989 and was sustained by a series of five-yearly ministerial conferences designed to strengthen collaboration and shape European and national agendas on health and environment. The EHPE process and the European Charter on Environment and Health comprised the backbone of the European environmental health policy context at that time. Based on the principles and strategies outlined in the European Charter for

Environment and Health, a resolution on health and the environment was adopted in 1991 by the Council and the Ministers of Health of the European Community, inviting the Community and its Member States to take steps to gather knowledge and experience about the relationship between health and the environment (WHO/Europe 1994). Another important objective was to improve environmental health management tools, as at that time the main tools being employed were Environmental Health Action Plans (an environmental health information system), the identification and assessment of environmental health hazards and risks, and a framework of enforceable legislation (WHO/Europe 1994). Out of these processes, The European Centre for Environment and Health (WHO/ECEH) was set up within the structure of the WHO Regional Office for Europe (WHO/Europe 1994). The mandate of this new centre was to assess the environmental drivers of human health injuries in Europe and to collaborate with member states on mechanisms to disseminate this information. This initiative is now established as two divisions, one in Rome and the other in Bonn. ECEH Rome focuses on developing evidence-based strategies and tools to protect health from the harmful effects of environmental hazards. ECEH Bonn collects and evaluates scientific evidence on air quality, chemical safety, environment and health information systems, housing, noise and occupational health (ECEH 2011).

Since its inception, and as both science as well as political interest evolve, the focus of these European environmental health initiatives shifted. While a thorough exploration of these shifts is beyond the purview of this thesis, it is worth noting the phenomenon of change in this context through citing selected examples. One example can be drawn from a shift of focus that emerged in the 1990s when microbiological contamination of food and drinking water and urban air pollution became new areas of concern. During this time, the definition of environmental health was also elaborated upon and has since then remained relatively stable. WHO-Europe formally defined the term 'environmental health' as those aspects of human health and disease that are determined by factors in the environment (WHO 2011b). Special attention was also given to transboundary issues like acid deposition and the pollution of river basins and to global problems linked to possible climate change. However, at the Helsinki Ministerial Conference in 1994, an even stronger governance approach was

articulated. Acknowledged were: 1. the linkage between environment and health and the need for closer co-operation between the health, environment and research areas in order to develop a community system that integrates information on the state of the environment, the ecosystem and human health; 2. the importance of institutionalizing environmental health as a policy domain, not only in order to improve collaboration between the environment and health sectors but also to include the consideration of environmental health within other policy fields such as agriculture, industry, transportation and energy; and 3. the intent to improve co-operation between the European, national and local level processes. In 1994, the European Environment and Health Committee (EEHC), was set up to help ensure the implementation of the Environmental Health Action Plan for Europe (EHAPE) and to serve as a steering committee for the Ministerial Conferences on Environment and Health.

Since its establishment the EEHC has become an important driver of the environment and health process both in the EU and the UK. It brought together representatives from health ministries, environment ministries and intergovernmental organizations, such as country members designated by the WHO Regional Committee for Europe and the United Nations Economic Commission for Europe (UNECE) Committee on Environmental Policy (CEP); representatives of the European Commission, the European Environmental Agency, the Organization for Economic Co-operation and Development, the Regional Environmental Centre for Central and Eastern Europe, the United Nations Economic Commission for Europe, the United Nations Environment Programme, and the World Health Organization Regional Office for Europe. The EEHC also involved nongovernmental stakeholders such as representatives of civil society like the ECO-forum, the Health and Environment Alliance, the International Trade Union Confederation, and the World Business Council for Sustainable Development. The Environmental Health Action Plan for Europe (EHAPE) was the major deliverable of the second ministerial conference (1994) and led to the elaboration of National Environmental Health Action Plans (NEHAPS) (deadline 1997). The NEHAPS aimed to avoid the duplication of efforts by international bodies and suggested coordinated actions in order to make the best use of limited resources,

both nationally and internationally. EHAPE recognized the importance of intersectoral cooperation and consultation for effective decision-making in the area of environmental health (WHO Secretariat 2005). This sharing of responsibilities was also intended to establish formal governance mechanisms at national and international levels.

In the UK, more specific environmental health legislation emerged in the 1990s. While preventative measures within the health service continued to focus on biological and life-style issues, local authorities began to work increasingly on environmental issues, spurred on by the support for such initiatives coming out of the European and international health contexts. A key element of these new initiatives was the delegation to Local Authorities to “promote the economics, social and environmental well-being of their areas” by adopting the Agenda 21 action plans for sustainable development and to actively develop health provision partnerships across regional and national bodies (Greengross, Grant and Collini 1999, p. 28). Unlike some of the other member states, the UK already had legislative, administrative and regulatory mechanisms in place, which enabled the UK to be the first country to publish a NEHAP (in July 1996). This opened up the opportunity for the UK to host the Third Ministerial Conference on Environment and Health, to meet the requirements of the UN Economic Commission for Europe’s (UNECE) convention on the Transboundary Effects of Industrial Accidents (Kleijnans et al 2003, p. 6) and to serve as a member of the WHO European Environment and Health Committee (EEHC) and on the WHO International Steering Committee for Evaluation of Environmental Health Policies and Action Plans (ISC). At the end the London Ministerial Conference in 1999, the reduction of water-related diseases and the establishment of health as a priority consideration in transport policy were identified as the new focus. Inspired by the Aarhus Conference on the ‘Environment for Europe’ (1998), the discourse of stakeholder involvement was also set out as environmental health matter. These shifts in focus involved a call for effective public access to information, an improvement of the communication and public participation, and access to justice for the public in environment and health matters—rhetoric that would enter UK public and environmental health discourse but not necessarily translate into actionable change.

One of the issues that dogged the UK has been an on-going fragmentation of health protection and promotion services, particularly in the arena of health and ecology. By the mid-1990s there was a growing effort to bring more cohesion to issues of environment and health in the UK. This was marked by a series of initiatives spurred on by existing documents and governance initiatives such as the UK's responses to 'Agenda 21' of the Rio Summit the Sustainable Development Strategy" (Slack 1997, p. 61). Part of this cadre of documents was also 'The Health and the Environment', a consultative document in the Health of the Nation (HON) series—a 'Green Paper' designed to seek consultation and build partnerships (described in the paper as 'health alliances') with stakeholders in order to work on selected areas of environment and health concerns. The stated objective of this paper was to improve the quality of the natural and built environments in order to protect and promote the 'health of the nation' (Slack, 1997, p. 61). In November 1996, prior to a national election, the UK government undertook a consultation to determine if the environment should be adopted as a new key area in their HON strategy, a process informed by the government's health action plan published earlier that year. However, in 1997 there was a change of government and the new Labour government appointed its first Minister for Public Health and published a document titled 'Saving Lives: Our Healthier Nation' (OHN) to replace the 'Health of the Nation' (Greengross, Grant and Collini 1999). While this new 'Green Paper', like the HON document, acknowledged that contextual factors, specifically social issues such as poverty, generate significant health inequalities, its frameworks for health intervention were different. For one, the Green Paper set out a new funding and conceptual strategy for health provision in the UK, one where Health Authorities were now responsible not only for purchasing health services for their jurisdictions but also for addressing the major causes of ill health.

By the mid-1990s these initiatives were being side-lined and the HON itself never identified the environment as a key priority. Behind the scenes the Government was reported to be reluctant "to acknowledge social, environmental and economic factors (particularly inequality and poverty) as major causes of ill-health" and this limited the potential of the strategy (Greengross, Grant and Collini, 1999, p. 27). Against this backdrop, the UK NEHAP was seen to offer an "overview of the provision of

environmental health in the United Kingdom [and] showed how current arrangements were ... helping to deliver improvements and set out a range of actions to deal with identified problems or to secure improvements in environmental health” (Kleinjans et al., 2003, p. 9). However, this initiative also fizzled out. In contrast to the successes of the construction phases of the plan, the UK NEHAP itself was never implemented. The reason given for this is that the results of the 1999-2000 review showed that the aims and functions of the NEHAP were already being fulfilled through other governance mechanisms, particularly the UK’s sustainable development strategy ‘A Better Quality of Life’ (Kleinjans et al., 2003, p. 2). Critics of the UK approach suggest that the discontinuation of an explicit NEHAP and its absorption within another policy field’s functions are really a case of “[hiding] environmental health in a sustainability framework” (Kleinjans et al., 2003, p. 15). In a separate study on the relationship between EU and UK environmental health governance more generally, Capleton, Stevens and Harrison (2005) found that the EEHP, the document informing the development of the NEHAP, had only a few marginal and direct influences on the UK policy development process but several indirect yet constructive influences, including “better cooperation between government departments, greater awareness of environment and health issues from an international perspective, and a higher political profile of environment and health issues” (Capleton, Stevens and Harrison 2005). The NEHAP was more generally lamented as a missed opportunity (Capleton, Stevens and Harrison, 2005, p. 549). The reasons given for the lack of direct impact or “lack of an implementation process” included that many European wide initiatives may have been superseded by domestic policy initiatives (Capleton, Stevens and Harrison, 2005, p. 549; Kleinjans et al., 2003, p. 8); that there was at times an absence of effective coordination and promotion strategies between stakeholders responsible for environmental health policies; and that there was a lack of appropriate indicators for measuring environmental health needs, progress and policy impact (Capleton, Stevens and Harrison, 2005, p. 549).

What was clear was that in the UK it was under the rubric of sustainability that the environment and health were most likely to be addressed. A key document influencing health governance has therefore been the UK’s strategy on sustainable development,

'Securing the Future'. Proponents of using this document as a key public health text suggest that this represents 'a new paradigm' that should be mainstreamed within public health in the UK (Griffiths 2006; Jeffery 2006; Morris et al 2006). The central point made when proposing the mainstream use of this model was that "the economic, social and environmental characteristics of a sustainable society are the same as those of a healthy society" (Griffiths, 2006, p. 582). Examples used to support this claim included the notion that "well-planned communities, including ready access to nature and biodiversity, improve physical, psychological and social well-being, especially for vulnerable groups, including those with mental health problems, and reduce crime, as well as minimize unnecessary demands on finite natural resources" (Griffiths, 2006, p. 582). The sustainable development agenda introduced into the governance discourse concepts such as 'sustainable lifestyles', 'low carbon lifestyles', 'low waste' and 'lifestyle' and the 'value of nature'. In these discursive moves various kinds of healthy environments and literacies, such as 'carbon literacy' and 'health literacy', are promoted alongside one another. One implication of this turn towards sustainability frameworks was that the definition of sustainability and the perceived place of health within sustainable futures would emerge as an important arena of discursive and practical contestation.

Many initiatives in the UK have been developed since the late 1990s, spearheaded by the NHS and the Department of Health as well as by local authorities, who had committed by 2010 to reduce by at least 10 per cent the gap between the fifth of areas with the lowest life expectancy at birth and the population as a whole (Secretary of State for Health 2004; Nutbeam 2008). Yet, with them the environment is not a central focus. In fact, by the year 2000, both in the EU and in the UK, the literature reflected an adoption of the notion of health and the environment as relating less to the concepts of health within lived contexts and more towards the technicalities of how to value and measure the links between health and the environment. The key health documents of this era are 'Saving Lives: Our Healthier Nation (1999)' and 'Towards a Healthier Scotland'. These documents identified four key health targets based on their being identified as the 'big killers': heart disease and strokes, accidents, cancer, and mental health. Separate public health documents for the constituent countries of the

UK identify that through addressing health inequalities the health of the worst off in society can be improved and the health gap in the UK can be narrowed. To achieve these goals each nation is asked to enter a 'National Contract'. Each contract is broken up into social and economic factors, environmental factors, lifestyle and services and action is targeted around 'Health Action Zones' and targeted by policy initiatives such as 'healthy schools' and 'healthy workplaces' (Garside, Dargie and Dawson 2000). The social determinants of health play an important role in this UK approach; however, while environmental determinants are listed, they are done so in relation to 'environmental health' and not the health sector.

As the 2000s have progressed, discourses in the literature have increasingly focused on the complexity of the issues. This has led to amplified attention being paid to the technicalities, implications, levers and mechanisms through which the environment and health could and should be addressed both nationally and internationally. During this decade the UK has participated in some international health initiatives and declined from others, arguably in order to maintain the ability to set national priority and strategies for meeting public health targets. For example, in 2004 at the Budapest Ministerial Conference, the special vulnerability of children and reproductive health to environmental threats was made explicit. The discourse 'environment, health and children' has been elaborated into a series of documents such as the Children's Environment and Health Action Plan for Europe (CEHAPE) (WHO/Europe 2004). CEHAPE focused on four priorities: 1. the reduction of gastrointestinal disorders by improving access to safe and affordable water and adequate sanitation; 2. the reduction of health consequences from accidents and injuries by promoting safe, secure and supportive human settlements for all children; 3. the reduction and prevention of respiratory diseases due to outdoor and indoor air pollution; and 4. the reduction of the risk of disease and disability arising from exposure to hazardous chemicals, physical and biological agents and hazardous working environments. The UK is a signatory to the WHO Europe Declaration on Children's Environmental Health, whereas with regard to the Amsterdam Treaty, which provides legal provisions for Community action in the field of Environment and Health, Ireland and the UK remained outside the Schengen agreement. What is common to these initiatives is a

grappling with their complexity and with the relationships between EU and member countries being forged through public health and environmental health initiatives.

During this time in the UK the players involved in the public health movement and in implementing health promotion have also shifted. In 2003, the UK government set up the Health Protection Agency as a national organisation

dedicated to protecting people's health and reducing the impact of infectious diseases, chemical hazards, poisons and radiation hazards. It brings together the expertise of health and scientific professionals working in public health, communicable disease, emergency planning, infection control, laboratories, poisons, chemical, and radiation hazards. We work alongside colleagues in the NHS, local authorities and many other organisations to provide leadership for health protection. (HPA 2011a)

The HPA is working to manifest the remit of public health as defined in 'Securing Good Health for the Whole Population' (Wanless 2004). In the UK, the HPA is being positioned to take up roles and responsibility and therefore to assume accountability within three domains of public health: health protection, health promotion, and high quality clinical services. The HPA is also working "to take on leadership roles at national, regional and local levels for health protection issues, and to play critical supporting roles for others" (HPA, 2011a), perhaps offering a way to bridge the gaps between various levels of health protection and promotion in the UK. Mechanisms for bringing about these shifts in roles and responsibilities within the public health system in the UK are being moved along by structures such as "performance management systems", which will cover the monitoring of Local Strategic Partnerships in order to ensure a focus on health protection issues so as to ensure they "contribute effectively to health protection" (HPA, 2011a).

In a 2004 response written by the HPA to the consultation document 'Choosing Health', a consultation on action to improve people's health, the HPA supported "the government's renewed emphasis on preventing disease, promoting health and reducing health inequalities" (Stewart and Troop 2004, p. 3) but did not outline its own commitment to addressing the environmental determinants of health. However, by 2005, the HPA had begun to grapple with this subject publicly in a statement outlining

how the HPA is seeking to work more closely with the Veterinary Laboratory Agency and the Food Standards Agency (HPA 2011c). In 2005 the HPA also responded with the publication of the Environment Agency's (EA) report *Better Environment, Healthier People* stating that as an agency, "it recognises the impact of the environment on health and well-being and in particular the effects of flooding and climate change, poor air quality, chemicals, inequalities and outdoor recreation" (HPA, 2011b). Specifically, however, in this response the HPA focused on the role of toxicity and chemicals within this framework, an easy approach to take because it is already an area of responsibility within the HPA. The HPA presented itself as taking action by signing a Memorandum of Understanding between the EA and its own Chemical Hazards and Poisons Division. Often in response to an environmentally driven health event, the HPA has also developed a small set of documents and strategies for specific issues linking health and the environment. These included the National Heat Wave Plan spearheaded by the Department of Health, aspects of the Climate Change Communication Initiative led by DEFRA and partners, and a variety of others currently being produced both at the regional level of PCT's and at the national level by the various governmental ministries and organisations with a growing mandate to address climate change.

Climate change and health is most recently emerging as an issue a public health agency like the HPA should address. Until recently, it was the remit of the UK The Department for Environment, Food and Rural Affairs (DEFRA)—the government department responsible for environmental protection, food production and standards, agriculture, fisheries and rural communities—to manage the Climate Change portfolio. In an interesting turn of affairs, on 3 October 2008, the national government formed the Department of Energy and Climate Change (DECC) taking the remit of climate change out of the realm of DEFRA. A governmental press release on 8 June 2009 stated that this is an era of concentrated focus on preparing for the inevitable challenges of climate and environmental change through initiatives such as the Living With Environmental Change (LWEC) partnership of UK governments, departments and research councils, which is claimed to be the biggest environmental research programme ever undertaken in the UK (O'Sullivan 2009). Within this framework,

“The Scottish Government is taking the lead on the programme’s health objective, looking at the impacts of environmental change on human, plant and animal health” (O’Sullivan, 2008). However, of the eighteen initiatives outlined in this programme, only two identify the HPA as a partner, The Environment and Human Health Programme (Partners: NERC, EA, Defra, MoD, MRC, The Wellcome Trust, ESRC, BBSRC, EPSRC and HPA) and the Centre for Environment and Health (MRC, DoH/HPA with interest from other partners developing) (O’Sullivan, 2009). The first initiative is designed to help prepare for “new and emerging diseases in ways that require close NERC, MRC and DoH collaboration” while the Centre for Environment and Health is intended to be a “multi-disciplinary grouping using a mix of more traditional and leading edge techniques ... centred around Imperial and Kings Colleges in London to identify and understand health impacts of a range of environmental changes on the scales that influence management policies and practices” (O’Sullivan, 2009). The HPA is not imagined, however, to be involved in programmes related to adaptation or resilience, in building understanding of natural and environmental risks, in centres on sustainable behaviours research, or in initiatives addressing knowledge exchange. However, the Department of Health and the Medical Research Council are identified as two of twenty partners who will be involved in public engagement activities designed to “ensure that the technological, economic and social changes that are necessary to combat climate change (for example) are acceptable to the public” (O’Sullivan, 2009).

This recent shift raises important questions about the place and purpose of public health in addressing some of the key environmental and ecological health determinants of our time. Some scholars have suggested that there has been a move to embrace the socio-ecological model of the determinants of health—the approach first set out in the 1986 Ottawa Charter and one needing updating for the contemporary moment. In the UK this approach has sometimes referred to as the “emerging public health agenda” (Hanlon et al., 2005, p. 1088). Griffith argues “in England much work is underway in most regions, with Government offices being a focus of leadership and activity” (2006, p. 582). To date, two action plans have come out of the Choosing Health white paper, one addressing issues of food and health and the other physical activity (Porritt 2005, p. 952). In Scotland, sufficient data has been

gathered to support the articulation of a vision for ‘integrated public health’ (Hanlon, Walsh and Whyte 2005). However, many critics including the Royal Society suggest that the commitments that the UK government is making will not meet the targets it has set to ameliorate the effects of climate change and therefore the impacts that fluctuations in global earth systems may have on human health and wellbeing. There are, therefore, many questions to answer about the future of public health engagement in the UK with environmental and ecological health concerns.

Factors that have influenced a distancing of health issues and health protection and health promotion frameworks from environmental initiatives in the UK may or may not pertain to the most recent development of the UK climate change strategy, but there are many that predate it which are both complex and difficult to pinpoint. In that the UK is engaged in an on-going interaction between international and national public health activity, shifts in the international community have a role to play.

Internationally, there has been a gradual shift within the health promotion community in the ways in which the environment has been addressed, which may have a role to play in normalising this division between health and the environment.

Between 1986 and the present there has been a significant shift in how the environment has been addressed, as a critical discourse analysis of two key charters—the 1986 Ottawa Charter and the more recent 2005 Bangkok Charter—illustrates. The first global WHO health promotion charter, the 1986 Ottawa Charter ‘Health For All by the Year 2000 and Beyond’, can be described as a document rooted in principles of eco-justice and laying out the principles for a socio-ecological approach to health promotion (Porter 2007, p. 73). The Ottawa Charter not only constructed a new health promotion discourse but it also ensured that socio-economic and environmental contexts were considered (Porter 2007). Porter states, “Ottawa ... emphasized ecological sustainability, holism and interdependency” (2007, p.73). The 2005 Bangkok Charter for Health Promotion in a Globalized World represents a radical departure from the Ottawa Charter as it marks a “shift from a ‘new social movements’ discourse of ecosocial justice ... to a ‘new capitalist’ discourse of law and economics in Bangkok” (2007, p. 72). As a result, while the Bangkok Charter identifies actions and makes commitments about how to achieve new public health goals—elements of a strategy

largely missing in the first charter—what is lost is an embrace of a holistic approach to health promotion and with it attention to environmental health. Porter argues the Bangkok Charter develops a discourse that “works to naturalize and perpetuate many of the detrimental determinants associated with ‘globalization’” (2007, p. 72). He goes on to claim that “Bangkok obscures subjects/actors via nominalizations, ‘adjectivization’, and actorless passive verbs” with the result that when addressing causes of health injuries, such as those related to environmental change, the Charter does not identify specific agents and causes of these changes (Porter 2007, p. 74).

This shift in discourse can be described as moving from Ottawa’s ‘new health promotion’ discourse to Bangkok’s ‘population health’ discourse (Robertson 1998). Porter (2007) argues that this discursive change occurs in two ways, as a change in focus from (participatory) democracy to (global) technocracy and from socio-ecology to economy. Examples of this shift are numerous and when applied to issues of environmental health specifically, the textual shifts show a change in guiding principles. The Ottawa Charter encouraged the notion of reciprocal maintenance where the common goal was to take care of one another, one’s communities and the natural environment. It is economic preoccupations, however, that guide the Bangkok discourse. For example, the 2005 declaration states that “effective mechanisms for global governance for health are required to address all the harmful effects of trade, products, services and marketing strategies” but does not tackle the question of shifting economic practices that have been shown to be a source of both environmental degradation and public health injuries (Porter, 2007, p. 76). As a meta-policy and governance context within which national health promotion strategies are developed, the changes in the WHO’s framing of and methods for addressing determinants of health injuries are important to understand, as they influence the general ethos within which public health responses to environmental health issues are shaped.

Shifts in UK governance may have also facilitated a move away from an ecological approach to public health. While health promotion was not easily embraced in the UK between the 1970s and the 1990s, by 1997 it was thought that a new era had been

ushered in, one characterised by a general focus on community-centred approaches and partnership building intended to promote more equity in society. This basic trend would theoretically have dovetailed with health promotion and social medicine orientations dedicated to reducing health inequalities—issues well documented in the UK by the 1980 Black Report and the 1988 Acheson Report. An observation shared by both reports was that the social, built and natural contexts within which people live, work and recreate impact their health; poor housing, poverty, unemployment, poor education and multifarious environmental hazards all affect health. While these issues were already subjects of practising environmental health officers (EHO) who were working on issues such as “overcrowding, food hygiene, health and safety at work and the infinite effects of pollution in our environment” (Slack 1997, p. 73) they were not necessarily on the NHS agenda. While the Labour government’s Third Way “rhetorically committed to healthy public policy” it is criticised for precipitating “a crisis in health promotion delivery” because of its roots in neoliberal ideology which has weakened the NHS infrastructure and within it the organisational capacity for health promotion (Scott-Samuel, Wills and Evans 2008, p. 521). Other contributing factors may include “the emergence of multidisciplinary public health, the sequence of changes to national health promotion organisations and the wider marginalisation of the public health movement” (Scott-Samuel, Wills and Evans 2008, p. 521) as well as devolution initiatives within the UK which have led to the creation of national health agencies working independently in Scotland, Wales, England and Northern Ireland.

The complexity of environmental health issues and correspondingly the responses they require may also be a factor. By 2003 the European Commission began taking into account ‘cocktail effects’, which are combined exposures and their cumulative effects, in their Strategy on Environment and Health. This was an important shift because until then policy actions focused on single pollutants in single environmental compartments (air, water, soil, etc.). The implications of this new framing were multiple, including the fact that integrated monitoring and data collection processes became necessary (Stassen, Gislason and Leroy 2010). Consequently, the European Commission collaborated with The WHO-Europe to develop an integrated information system on the state of the environment, ecosystems and human health.

Discourses on governance are also increasingly addressing integration issues, such as investigating the ‘interrelationship’ between systems and structures of governance. One of the central discourses in this effort has been the notion of an ‘integration of perspectives’ on a health situation rather than the production of a series of single issues. As Jeffery suggests, this should mean that issues such as “climate change, future energy sources, poverty, water supply and sanitation and public health should all be seen as related and considered in a broad context that includes the vast differences between per capita use of resources between the developed world and the under-developed world” (Jeffery 2006, pp. 606 - 607). Certainly in the UK, public health itself has also become more complex, both in terms of health issues and in terms of the systems and structures being developed to respond to them, as discussed earlier in this chapter.

Conclusion

This chapter set out to review the structure of the public health sector in the UK, with a focus on England, in order to identify where and how the responsibility for environmental health is demarcated. Observing the structure of the UK public health system shows that the place of the natural environment is relatively fluid, as is the structuring of the public health system itself. To this understanding are added insights from the review of the environmental health policy arena in the UK, conducted through a contemplation of actors, discourses, resources and rules of the game. This Policy Arrangement Approach (PAA) analysis has shown the formulation of an increasingly structured environmental health policy arena. However, what has also become evident is the loose fit between the assumption of responsibility for environmental health initiatives within the public health sector and governance frameworks intended to guide environmental health practice at the scale of individuals and organisations working on population health, whether in formal public health organisations such as the HPA or in regional and local bodies such as PCTs or SHAs of the NHS.

Recent efforts to connect up environmental health and public health initiatives include DEFRA's *Natural Environment White Paper, The Natural Choice* which is based on the UK National Ecosystem Assessment and outlines a fifty-year vision for care for the natural environment. Whilst ecological sustainability and care for the environment—the focus of the document—are essential to human health, the explicit link to public health is not one of the themes developed in it, with the exception of one page which references a Department of Health white paper (DEFRA 2010). That paper, *Healthy Lives, Healthy People: Our strategy for public health in England* outlines what is being described a 'radical new plan' for a public health service for England which

recognises that the quality of the environment, including the availability of green space and the influence of poor air quality and noise, affects people's health and wellbeing. It details plans for a shift of power to local communities, including new duties and powers for local authorities to improve the health of local people. From April 2013, Directors of Public Health will be employed within upper tier and unitary local authorities. They will be ideally placed to influence local services, for example joining up activity on rights of way, countryside access and green space management to improve public health by connecting people with nature. (DEFRA 2010, pp. 46-47)

The Department of Health anticipates that "by joining up the local work done by the NHS, social care, housing, environmental health, transport and leisure services and focusing on public health at a local level" health and wellbeing will be improved and health inequalities addressed (DoH 2010b). The future of this initiative stands in the balance of the revamping and ratification of what is now a controversial Health and Social Care Bill 2011, due to take full effect in April 2013 (DoH 2011).

Another document in this constellation is the *Sustaining a Healthy Future: Taking action on climate change*, the joint plan of the Faculty of Public Health, the NHS Sustainable Development Unit and the NHS Confederation (Griffiths and Stewart 2009). This document focuses on climate change mitigation through the mechanism of reducing the carbon footprint of the NHS, which is the "largest single organisation in the UK, representing on average ten per cent of regional economies in England alone" (Griffiths and Stewart, 2009, p. 26). Adaptation strategies receive cursory mention, with identifying vulnerable groups, heat wave planning, flood resilience management,

urban planning and contingency planning as immediate goals. Offering an ecologically informed perspective on health and the environment is the UK National Ecosystem Assessment, which in its Chapter 23 offers a technical report on health and ecosystems in the UK (Pretty et al 2011). While cross-referencing is occurring to some extent, it seems crosspollination is less frequent between all of these documents.

Rare are references to the precautionary principle which states that if an action or policy has a suspected risk of causing harm to the public or to the environment, in the absence of scientific consensus that the action or policy is harmful, the burden of proof that it is not harmful falls on those taking the action (Raffensperger, Tickner and Jackson 1999; Zander 2010). Although the European Union has communicated and adopted the intent to use the precautionary principle, this is one discourse that is not yet widely expressed within environmental public health discourse in the UK. One step forward may be the National UK Ecosystem Assessment, which introduces a discourse of care for future generations with its fifty-year plan. In environmental epidemiological terms this reflects upstream thinking and is a reasonable timeframe for working on improving the health of populations at the interface between the social and the natural world.

In conclusion, the material presented in this chapter shows that environmental health is an active area of theory and policy building, which has the intent of influencing thought and practice in the health field. There are more steps that need to be taken for the now formal policy arena of environmental health to be translated for use within the public health sector. In turn, the public health sector needs to create ideological and structural receptors and mechanisms for uptake so that environmental health theory and practice, ideally informed by ecological principles, systems thinking and complexity, can be of benefit to the UK public health sector. As part of this the role of organisations such as the HPA and the UKPHA and the relationship between them will require clarification. In the next chapter I pose the question of how health is being studied in the nexus of the social and the environmental within academic texts. I turn to these documents because research is often the conduit between the empirical and the theoretical world and between governance and practice.

Chapter Four

Social Theories of Health, Public Health and the Environment

Thus far this thesis has presented the idea that the social, the natural environment and health are conceptual assemblages produced through and put to work for specific ends within social relations of power (Chapter One). A policy analysis has shown that the natural environment is formally considered relevant to population health in the UK even though how this formally fits into the UK public health sector is still under elaboration (Chapter Three). This chapter focuses on the role of academic journals (Wellington and Nixon 2005) in constructing ideas about the relevance of the natural environment to human health not only within social studies of health but also in public health field practice. Recall from Chapter Two that this chapter presents key findings from a comprehensive summative content analysis of 2758 articles sourced from three journals: 1. *Critical Public Health*; 2. *Journal of Epidemiology and Community Health*; and 3. *Sociology of Health and Illness* (see also Appendix Four for a key word usage summary of the content analysis by search term). As discussed in the methodology chapter, when read together the three journals offer insights into how various iterations of the social studies of health construct the relationship between health and the natural environment within the theoretical sphere.

Overview

Appraising the literature first for general trends, one of the initial patterns to emerge is the frequency of word usage. These patterns suggest general discursive clusters. Across the three journals, the terms most often used were nature, the environment, environmental health, and biology. Less frequently, although still substantially utilised were the terms air, water, climate, chemicals, and ecology, with weather coming at the end of that group. The most infrequently mentioned terms were earth, planet, ecosystems, and biodiversity, and never cited was the term EcoHealth (a specialist framework for thinking about the links between health and ecology). Broadly, what these frequencies suggest is that topic specific discourses are being developed, for example discourses on health and the environment or the links between the social and

the biological in health studies, yet the infrequency with which terms such as earth and the planet were used suggests that overall a large scale reframing of the place of the natural world within health studies was not yet occurring within these journals. The heat map charts below present a cursory summary of the data, with the dark red cells representing high scores moving through the colour spectrum to the dark blue cells which represent the smallest numbers. The first column lists the key words (factor) searched for using Boolean search terms. The second column presents the total number of articles identified through the Boolean search. The third column shows the numbers of articles that made it through an initial cull conducted using the 'find' tool to evaluate all instances of a term in an article (not just usage in titles and abstracts, as many environmentally oriented concepts are not usually that central to a study). The fourth column identifies the number of articles where the natural environment (as opposed to a social environment for example) was mentioned. The fifth column represents the percentage of articles which addressed the natural environment as a health determinant, whether the reference is made as one sentence or as the key theme of the article. As Appendix Four illustrates, all 'on topic' mentions were considered valuable to this discourse analysis.

Critical Public Health				
Factor	Boolean Search	# Reviewed	# on topic	% on topic
Air	36	13	13	36
Biodiversity	6	6	3	50
Biology	77	25	9	12
Chemical	16	8	8	50
Climate	51	22	19	37
Earth	5	5	4	80
EcoHealth	0	0	0	0
Ecology	33	26	5	15
Ecosystem	7	7	4	57
Environment	209	36	25	12
Environmental Health	107	50	13	12
Nature	251	26	3	1
Planet	5	5	2	40
Water	48	21	21	44
Weather	10	7	7	70

Figure 7. Summary of the Critical Public Health Journal Analysis

The first journal presented is *Critical Public Health* (CPH). Reinforcing the points made in the paragraph above, while the term environment is widely used, a closer analysis shows that only 12% of these instances were references to the natural environment. The findings for the key word 'earth', in contrast, show that while the term was seldom used, when it was used it referred to the natural environment 80% of the time.

This analysis shows that a small group of scholars publishing in this journal are looking critically at the links between public health and the environment and, while their work does not comprise a large percentage of the overall articles, within this subset of the literature they are making explicit links between the health of the earth and the health of humans. Similarly, while only a few articles come up in Boolean searches for key words such as biodiversity, ecology or climate, when they did they also offered a comprehensive and sustained account of the links between health, the social and the environmental. CPH, therefore, makes a small but radical discursive contribution to academic conversations on health and the environment and underscores the pressing quality of these issues.

When addressing the subjects of chemicals, weather, water and air, the CPH offered more than epidemiologically oriented comments on health and the environment as it also focused on the politicisation of these public health issues. The review of the rise of environmental health policy and mandates offered in Chapter Three also illustrates how central these issues are to global health, particularly in the developing world, and increasingly to children's health internationally. Research on health inequalities also highlights that contaminated water, air, and food are significant sources of morbidity and mortality. The focus on these areas in CPH touches on the links between these environmental health problems and health inequalities and reflects the engaged approach to public health scholarship in the journal.

The *Journal of Epidemiology and Community Health* (JECH) is favoured by epidemiologists who have social medicine proclivities. Perhaps not surprisingly, the terms weather and chemicals exhibited the highest degree of use as natural environmental concepts. Between the two terms alone, 674 articles were published on these subjects during the years being researched. Some of these articles modelled innovations in epidemiological approaches to the study of health and the natural environment, for example collaborations between meteorologists and epidemiologists. The work on chemicals is also noteworthy as it followed complex pathways and maintained awareness of both proximate and distant environmental vectors. On the intersections between illness and social activities with environmental consequences,

Journal of Epidemiology and Community Health				
Factor	Boolean Search	# Reviewed	# on topic	% on topic
Air	876	218	83	9
Biodiversity	7	7	3	43
Biology	1183	44	25	2
Chemical	427	75	65	56
Climate	320	68	31	10
Earth	59	42	8	14
EcoHealth	0	0	0	0
Ecology	676	97	10	1
Ecosystem	31	26	4	13
Environment	1459	128	20	1
Environmental Health	2189	59	4	0.2
Nature	514	9	6	1
Planet	26	17	8	31
Water	767	100	72	9
Weather	247	187	180	73

Figure 8. Summary of the Journal of Epidemiology & Community Health Analysis

subjects discussed were industrial emissions, car use, and agrochemical use in the agricultural industry, for example. Another theme was the release of environmental chemicals into the environment and the various pathways through which exposure occurs.

Largely, the orientation taken in this journal contrasts those taken in CPH and in the SHI (discussion to follow). It is difficult to identify where the points of intersection might best be if the goal is

to build theory and practice around environmental public health. This is an interesting dilemma given that both CPH and JECH (and the communities feeding them) are informed by the social medicine paradigms, which trace their lineage through Virchow. Perhaps one of the greatest differences is the use of more qualitative social science and theory based approaches in CPH and the epidemiologically oriented quantitative approaches of the JECH. As is a theme throughout this thesis, while these approaches to knowledge formation are themselves constructs and social practices they continue to demarcate disciplinary arenas. When placed within larger professional debates about the value of hard and soft scientific research to health studies, these approaches exacerbate existing challenges already making dialogue between research spheres—even within the same discipline—difficult. Given a further twofold consideration, firstly that public health is itself considered a Cinderella discipline within medicine and secondly that public health has the positive mandate to generate health and wellbeing for populations, making it ideally positioned to care for the health of people at the social-environmental interface, there are many reasons to try to overcome these challenges.

Sociology of Health and Illness				
Factor	Boolean Search	# Reviewed	# on topic	% on topic
Air	174	52	15	9
Biodiversity	2	2	2	100
Biology	503	170	32	6
Chemical	133	70	6	5
Climate	158	61	8	5
Earth	71	46	7	10
EcoHealth	0	0	0	0
Ecology	153	52	4	3
Ecosystem	5	3	1	20
Environment	740	120	2	0
Environmental Health	259	139	15	6
Nature	1081	267	7	1
Planet	24	1	1	4
Water	192	77	11	6
Weather	41	22	6	15

Figure 9. Summary of the Journal *Sociology of Health and Illness* Analysis

Standing outside of the public health sphere, the journal *Sociology of Health and Illness* (SHI) does not often engage directly with issues of the public health sector. However, through its study of the medical sector, medical practice and experiences of health and illness it does offer another set of insights into how social studies can be used to conduct social epidemiological studies of health. A broad scan of this journal

shows that the most used concepts are nature, environment and biology,

and that only 1-6% of the time did these terms refer to the natural world. This suggests that the naturalistic turn in language is shaping discourses in SHI but also that what is being done to these concepts within medical cosmologies has been an important analytical theme throughout the course of this journal. In particular, critiques of the natural and the biological are at the heart of the work presented in this journal, as are challenges to nature/culture divides. The theoretical journeys of bringing biology back into dialogue with sociology (Williams, Birke and Bendelow 2003) or putting the 'body back into' sociology by "putting minds back into bodies, bodies back into society and society back into the body" (Williams and Bendelow 1998a) are also concrete offerings to the project of bringing the environment (back) into social studies of health made through this journal.

Read together, broadly, *Critical Public Health* offers insights into the social drivers behind environmental health injuries and advances the imperative to ameliorate them through working upstream, while the *Journal of Epidemiology and Community Health* makes practical contributions to field research, such as increasingly nuanced techniques within environmental epidemiology and models and frameworks for

thinking about multiple variables at work in a health event. *Sociology of Health and Illness* offers insights into the structure of social scientific thinking and the challenges of expanding social analysis to include phenomena not traditionally considered 'the social'. A systematic, comprehensive review of the journals also shows that each fulfils its respective mandate and works within its disciplinary framework on stipulated areas of focus relevant to organisations affiliated with the journals.

Importantly, this research also shows that a small number of committed researchers are pushing health studies to 'wake up' to the severity of environmentally driven health issues and advocating that action be taken as a central priority for the health sector. Within the context of public health and medicine their work can be deemed radical, innovative, contested or rejected in favour of maintaining 'business as usual' paradigms. Given that many of the 'cutting edge' assertions are recent, this thesis does not track 'what happens next', for example if these proclamations fade away or catalyse new projects. What occurs next will illuminate the relations of power at work in the production of public health knowledge and the role that knowledge formation has in shaping the social world, including how power works within the mechanisms of producing 'healthy populations' and 'healthy environments'.

In the following sections I move from a horizontal to a vertical reading of the texts to highlight specific ways scholars approach health at the nexus between the social and the natural world. Necessarily, this is a summative description presented in seven conceptual clusters: 1. Earth and Planet; 2. Nature; 3. Environment; 4. Biology; 5. Climate, Weather, Air, Water and Chemicals; 6. Environmental Health; and 7. Ecology, Ecosystems and Biodiversity. The analysis begins with a consideration of work on health at a meta-level and moves through to the specificities of the natural elements, with the last two groupings discussing elaborations on environment and health work. The goal of this section is to highlight moments in the journals where a particular discursive practice describes a general trend, or is a line of flight out of the discursive terrain of the discipline.

Earth and Planet

Decentring of the primacy of the social was a discourse beginning to emerge in the literature. The journal *Critical Public Health* is where the authors with the greatest affinity for this approach published. Work on the ecosphere as the meta-context calls for a reorienting of the focus of the health services (Baum 2001; Nutbeam 2008; Hanlon and Carlisle 2010; Poland and Dooris 2010) based on the view that “public health and the health of the planet are closely interrelated” and therefore require “joined up thinking and action” (Poland and Dooris, 2010, p. 281). Integral to these discourses was a concern that the natural limitations of the earth (Poland 2010) are not being addressed sufficiently (Nutbeam 2008). Measures to counteract the exhaustion of the planet were also discussed in movements to ‘green’ the ‘settings approach’ or by calibrating the notion of ‘settings’ to introduce concepts such as holism, sustainability (Poland and Dooris 2010) and ecological thinking (Hanlon and Carlisle 2010; Springett, Whitelaw and Dooris 2010). These holistic concepts may be somewhat foreign to contemporary public health but within other disciplines they represent more mainstream frameworks and therefore the articles invoking a meta-context are in a sense engaging in translational work across disciplines.

Earth-thinking is a form of context-thinking particularly within health studies and adds a fourth meta-level to the micro-, meso-, and macro-levels of analysis. The discourses of earth as meta-context include instances where the earth was identified as the place where we live and die and as the provider of life (Williams, Woodby and Drentea 2010). Bendelow and Williams show that perceiving self as a ‘being in the world’ generates a conscious relationship between body and mind as well as between the notion of self and the world (Bendelow and Williams 1995, p. 149) and opens up new possibilities for understanding illness and disease and health and healing.

Holism was another framework used for thinking about interconnection, particularly as a counter narrative to dualistic frameworks of health and illness. Reflective of medical sociological areas of research, holism was discussed primarily in terms of the interrelationship between mental and physical states (Curtis and Jones 1998, p. 656)

and in reference to Complementary and Alternative Medicine (CAM). Within work on CAM two main discourses were developed: 1. the notion of the increasing toxicity of the planet, and 2. the growing disconnection of people to earth systems (Sered and Agigian 2008). Holistic sickening was one term used to describe “our lost connection with the natural world and Mother Earth” (Sered and Agigian 2008, p. 622). Put to work most frequently where the concepts of psycho-social environments and the bio-psycho-social approach to health, particularly mental health.

CAM research was the area where the earth was most likely to be directly discussed as part of the discourse of healing. Ideas about the earth as a direct source of sustenance and healing in work on the Earth Medicine of Native American practitioners (Sered and Agigian 2008); homeopaths’ belief in the interconnection between spirituality, healing and the earth (Frank 2002); and self-healing by individuals through sourcing the restorative energy from Mother Earth and Father Heaven (McClean 2005) are all instances of the earth as healer discourse. As these examples demonstrate, when the research moves outside of the strictures of the biomedical cosmology, medical and healing discourses referencing the natural world abound. In these cosmologies, as in discourses of holism, where disconnection from and the destruction of nature occur, mental and physical suffering results. Yet these same approaches also hold central the view that connection to the earth heals.

Nature

Nature, as is planet earth, can be imagined as far removed from the social through to being an integral part of the healing process if one is in intimate exchange with the natural environment. For example, in the journal *Critical Public Health* nature is presented in some work as either a resource or a form of health capital, an approach which reflects discourses about nature circulated widely within industrialised societies (Labonté and Torgerson 2005) with separation from the natural world being a source of health deficit (Dooris 2006). As in work on holism, other authors took another route, sourcing the empirical rather than the theoretical world. Some scholars suggest that a new way of thinking about the natural world is needed within health research.

They suggested a new discipline of sustainability science or the older insights of Hippocratic medicine, or even Goethean approaches to science “whereby the organising idea in cognition comes from the phenomenon itself, instead of from the self-assertive thinking of the scientist ... it is not imposed on nature but received from nature” (Dooris, 2006, p. 277-78).

Nature is also an ideologically laden concept. Since the Enlightenment, it has often been contrasted with the social within dualistic descriptions of reality, as was discussed in Chapter One. One article in the SHI to directly address this issue is Bendelow’s work on emotional health, in which she uses binary constructs such as nature/social or social/biological to think through themes of alienation and a loss of embodied knowledge. She highlights the holism of Hippocratic medicine, which saw the body as a microcosm of nature, and contrasts it with biomedical cosmologies, which view bodies, emotions and experience as problematic unless tamed within the biomedical approach (Bendelow 2010). The changing conception of nature in Western thought is used by others to show that biomedicine itself is a form of (ever changing) social knowledge (Mizrachi, Shuval and Gross 2005). Moving from looking at biomedicine within society to looking at how biomedicine has developed, using nature as a guide shows how nature is being conceived reflects trends within medicine. Using dirt as an example, Armstrong explains that sanitary science treated nature, embodied by elements such as dirt, as a pollutant that would make people sick. In contrast, the post-war new public health developed a new ‘dirt hypothesis’ which suggested that “many modern illnesses might be due to a failure to allow dirt to challenge developing immunological systems” (Armstrong 2006, p. 875). This view collides, of course, with another discourse in risk society research which claims that nature is producing ‘dangers everywhere’ and that everyone is ‘at risk’ from environmental threats, such as pollution (Armstrong 2006).

Articles on genetics show a similar pattern of binary conceptualisations at work and also demonstrate how the dualistic frameworks are being shown to be inadequate from within the scientific framework itself. In genetics, as in assisted reproductive technology, there are moments when ‘nature’ and ‘the social’ are no longer distinct

(Bartley 1990; Kelly and Field 1996). Drawing inspiration from Strathern's anthropological work, one sociological study has brought this observation into social theory using the concept of 'after nature'—a state when the natural and the social or cultural are no longer “merographically related”, which occurs when new reproductive technologies are used to conceive. The merographic is a model of relationship where separate ideas write or describe one another, such as nature and culture (Strathern 1992). In these moments distinct natural and social facts no longer define the process of procreation or the “constitution of family and kinship” (Grace and Daniels 2007, p. 696). Calling for a rethinking of the “nature of” conception, Grace and Daniels see this as an opportunity to think about modernity or existence in a ‘postplural world’, one where people are ever more composed of ‘other’ elements “whether in terms of organ transplants, or the borrowing of cultural forms or the imitation of other individuals’ lifestyles or even the transmission of genetic particles” (Strathern in Grace and Daniels 2007, p. 706). The sociological approach to gene-environment theorising using a critique of nature/social dualisms to translate these biological observations into social theoretical terms is conceptually catalytic, as it offers new ways of approaching the study of people in the world.

In contrast to the critical theory orientation of CPH, the articles in *Epidemiology and Community Health* (ECH) reflect the applied focus of epidemiology. In texts with an epidemiological focus nature appears as a space that is either detrimental to or salubrious for human health and which receives attention strictly for its ability to increase or decrease human health. Running through this work as an explicit (Bettcher and Lee 2002) or an implicit theme is the discourse of interconnection. ‘Greenspace’ is a synonym for nature; for example “urban green space, agricultural space, and natural green space” such as forests and nature conservation areas were identified as ‘natural spaces’ with “the enjoyment of nature not [being] obvious anymore. Urban areas have recently experienced a decline in the quality and quantity of their green space” (Maas et al 2006, p. 587). More typically, however, greenspaces are a ‘means to an end’, a resource: “In the hectic society in which we live there is a growing need for nature as a source of relaxation and recreation” (Maas et al 2006, p. 587).

What is striking about the nature-as-healthy-or-unhealthy-space framework is that there is not a contemplation of the myriad constant interactions between the natural and the social through biological processes, such as breathing, eating or seeking shelter. Nature's effect on humans is seen to be limited to specifically positive or negative interactions.

Nature as counterpoint to the social in the biomedical approach is a theme that reasserts itself here. An integrative biomedical approach was used to argue, for example, that "it is well known that the epidemic of any infectious disease is not only a biological phenomenon but also a social phenomenon" and that its origins and spread occur "only when affected by certain social and natural factors through acting on the source of infection, the mode of transmission, and the susceptibility of the population" (Tan et al 2005, p. 190). In contrast, research on folk medicine, rooted in naturalistic knowledge and intimate relationships between people and nature (Fabrega 1977, p. 214), natural functions (Curtis 2007) and natural processes (Pilkington et al 2004), highlight that in these frameworks, natural and supernatural phenomena are, without contestation, perceived to cause illnesses (Fabrega 1977, p. 214). In *Epidemiology and Community Health*, hegemonic structures which value and devalue the knowledges presented were not discussed. The journal, therefore, generally tends to accept the framing of nature as a space within which epidemiological studies are undertaken and in more conceptual pieces, as a counter-point to the cultural or the social. For the work published, nature did not need to mean the phenomena of the non-social physical world.

Reading these three journals on issues of nature illuminates a wealth of sophisticated insights, highlighting the myriad ways these concepts are constructed within disciplines and how they focus on particular components of the natural and the various scales at which they are operationalised, ranging from the microbial to the planetary. A lesson that is clear is that each discipline offers insights into a certain dimension of these two phenomena, and that, if health issues are brought to life—operationalised—through a variety of scales, contexts, and relationships, a rich and nuanced insight into health at the interplay between social and natural environmental factors can be

gained. How genetics or the body are being studied are two good examples of a multi-perspectival approach to health research, although not necessarily how this knowledge is being put to work within health settings.

Environment

The environment, like nature, is a widely used term. In this thesis I have already identified it as ubiquitous to the degree that it becomes an empty conceptual container. Again, contrasting the two terms, while nature maintains a philosophical abstraction within most discourses as a concept of 'context', the environment is a setting more closely bound to the social. This may be because while nature is invariably 'out there,' the environment is multiple and somewhere between untameable wilderness and the familiar social. For example in health research 'the environment' can be a social, built, physical or natural space but it is apprehended as determining of human health in some way or another. The double move of claiming the environment within social epidemiology but manipulating what kinds of environments matter is observed in all three of the data sources collected. While these actions are amply rationalised and even pragmatically supportable they are antithetical to the project of developing ecological thinking in public health.

In articles in the journal *Critical Public Health*, the environment mattered most to health in instances where human activity had damaged the environment (Southern Health and Social Services Board 1993; Christakos and Lai 1997; Brown et al 2001; Driedger and Eyles 2001; Brown et al 2004; Potts 2004; Labonté and Torgerson 2005; Potts, Dixey and Nettleton 2007; Carlisle and Hanlon 2008b; de Leeuw et al 2008; Labonté 2008; Nutbeam 2008; Sorensen Allacci and Chang 2009; Baum and Fisher 2010; Hanlon and Carlisle 2010; Poland and Dooris 2010; Roberts 2010; Springett, Whitelaw and Dooris 2010). Yet in other work, it wasn't the ways in which a damaged natural environment can make people sick but rather how these spaces can heal that was the focus, for example the healing qualities of parks or blue and green gyms. Blue and green gyms refer to natural spaces in which people can engage in the double win of improving their fitness by enjoying the outdoor environment (for example through

hill walking) or helping to improve it (i.e., through nature conservation projects). Blue gyms are waterways, such as oceans or rivers, where people recreate and exercise, and green gyms are greenspaces such as parks and forests.

Cultivating a proactive optimism about health is another theme, expressed through discourses of cultivating “supportive environments for health” in order to address “underlying threats to the ecology of the planet” (Nutbeam 2008; Springett, Whitelaw and Dooris 2010). Employing ‘upstream thinking’ (prevention), cultivating ‘health literacy’ (Nutbeam, 2008, p. 439) and protecting ‘environmental wellbeing’ as a way to protect human health (Dooris 2004), such as by practising ‘environmental stewardship’ (Poland and Dooris 2010) are other examples of a positive approach to health and the environment initiatives. Within governance frameworks, another strategy proposed was one of accountability by requiring that public sector procurement processes be demonstratively environmental, local, green and ethical (Dooris 2006). By contrast, contesting the links between health and the environment was another theme running through the literature and perhaps a more apparent one as well. Some authors raised the problems generated by inconclusive science, the challenges of complexity and the variability of environmental drivers. Others reported on the reticence of public health organisations to engage with environmental issues due to issues of jurisdiction, organizational scope and funding structures, as well as a lack of professional incentives rewarding environmentally oriented research (Potts, Dixey and Nettleton 2007). Yet others submitted that relations of power, economic imperatives and ‘business as usual thinking’ seek to exclude the environment from discussions on health. Looking again at what the environment is and what work it is being put to within these texts shows that even when the importance of the link between health and the environment is embraced, the propensity is to focus on a healthy planet for healthy people, making it a coupled concept (Ellison and Jones 2002; Dooris 2006; MacFarlane 2007; Nutbeam 2008; Springett, Whitelaw and Dooris 2010) with a unidirectional focus (Nutbeam 2008). The discourse is not, therefore, about interdependence but rather reflects a traditional approach to thinking about the environment as a health determinant.

Commenting on a related, albeit different set of issues, one researcher expressed concern with the strategy of bringing the natural environment into theory because while this can lead positively to a conceptualisation of ‘plural environments’ it can also negatively lead to a “collapsing of the categories of economy, politics, science and culture” within the concept of the (social) environment (Potts, 2007, p. 136). Bringing the natural environment into a health equation as just one more variable often dilutes its importance or leads to the environment being overwhelmed by the significance attributed to the other variables, particularly within socially oriented studies. For example Dooris (2006) theorised that not only the environmental sphere but also the economic and social spheres should be considered when thinking about health drivers and health responses, yet the approach did not open up an analysis of the interaction between the spheres thereby merely adding more spokes to the conceptual wheel. A more interactional approach is offered in articles where multiple component analyses take into consideration the multidirectionality of interaction across scales, such as articles discussing genetic research examining the phenotypic consequences of specific intrinsic gene interactions and how they are impacted by variables in the extrinsic environment (Ellison and Jones, 2002). This is theorising on the interplay between the “social and environmental” and is highly instructive for medical sociology.

In the *Journal of Epidemiology and Community Health* (ECH), the ‘natural environment’ was a synonym for a variety of ‘environments’ including the built environment (Elliot 1995), the living environment (Maas et al 2006), the urban environment (Galea et al 2005; Björk et al 2008; Arbex et al 2009; Cutts et al 2009), neighbourhoods (Cummins et al 2005), and greenspaces (Adams et al 2003; Maas et al 2006; Mitchell and Popham 2007; Maas et al 2009; Richardson and Mitchell 2010; van den Berg et al 2010). The theme of methodological innovation emerged in discussions of context, particularly in relation to how to measure “‘true’ features of the local social and material environment that may affect health” in addition to using “off the shelf global measures of deprivation’ gathered from the census and surveys” (Cummins et al 2005, p. 209). Toxic environmental studies were another arena of innovation. Incidentally, the interest in toxic environments may reflect a historical interest in toxic environments in social medicine which may have accrued over time into a strong

research tradition, particularly in areas such as lead poisoning (Elwood et al., 1977, p. 155). Despite the link to tradition, thinking anew about how to gather evidence for environmental contamination, one article described a study which ‘pushed’ the bounds by gathering specimens from air, dust, undisturbed grassed soil, vegetation, and tap water (Elwood et al 1977, pp. 155-156). This work was lauded as ‘exciting’ and ‘innovative’ by some (see Will 2010) although others were more cautious, arguing that the toxicity of substances found in the natural environment is an area needing more attention, particularly within health promotion initiatives (Ferguson, Sellar and Goldacre 1992; Arbex et al 2007).

An emerging trend is that, at least in the short-term, change may occur not in how the environment is conceptualised but rather in elaborations upon existing theories and methods. It remains to be seen if innovating in this way will sufficiently activate the natural world within existing health research frameworks. I come to these conclusions in part because the articles reporting this work tended to be unconcerned with the framing of the natural environment. This is perhaps understandable, as it was not the focus of the articles, but it is also disquieting as testing for environmental particles *in vivo* as opposed to using off the shelf data can be lauded as ‘innovative’. This is also only part of the story, as in ECH other articles directly engaged with issues of how to operationalise the environment in more ‘green’ ways, such as through the concept of ‘greenspace’ (Maas et al 2006; Mitchell and Popham 2007). Again, however, the distinct challenges in imagining an environment as context and identifying mechanisms through which to bring that environment alive in the laboratory and within epidemiological analytical frameworks are connected theoretically but separated technically. The authors note that both the quantity and the quality of greenspace are important when determining the relationship between greenspace and health. This needs to be taken into account in the research (Mitchell and Popham 2007, p. 683), which may help to bridge these spaces and put qualitative and quantitative measures into dialogue. Given these observations, it is not surprising that in this epidemiologically oriented journal the need for multi-sectorial and multidisciplinary approaches to the study of the determinants of health was also raised as an issue, with

the environment being explicitly listed as one area requiring such attention (Bettcher and Lee 2002).

In contrast, in *Sociology of Health and Illness* (SHI), the natural environment was not a significant theme but use of the term 'environment' in reference to a health setting was relatively common, particularly within 'studies of context' (Frohlich, Corin and Potvin 2001). The physical environment (Pinell 1996) was mentioned, but the built, urban, rural or neighbourhood environments were predominantly the focus. Harmful physical factors in the environment such as polluted or hazardous workplaces, which were blamed for health injuries, were most often discussed, an approach reminiscent of that taken in the CPH journal. Where SHI excels is in health inequalities studies, which uses material explanations to challenge classical measurements such as increased life expectancy or material progress for being unable to explain the persistence of social and related health (Wilkinson 1990; Sheaff 2007). Psychosocial stress and the physical environment and the ways in which they interact and interpenetrate over time was one way that health inequalities and the environment were linked (Elstad 1998, p. 602).

Standing as an exception to the general trend in SHI, which does not consider the natural environment as its own conceptualisation, research on medical cosmologies and Complementary and Alternative Medicine (CAM) used the natural environment to substantiate the critiques rendered against biomedicine in particular (McClean 2005; Jackson and Scambler 2007; Sered and Agigian 2008). One author argued that the indirect pathway and extended period of time between the environmental driver and the health injury renders it difficult to treat the natural environment as a health determinant within biomedicine. Surveillance medicine is less prone to this criticism because it theorises a multitude of spaces within which risks to health may occur, including life spaces where chemical, biological and physical factors are at play. In surveillance medicine, therefore, the natural environment is more likely to be considered an epidemiological agent or at the very least, if not a full agent, a new driver relevant to medicine that warrants more investigation. While this medical model has been critiqued convincingly through a Foucauldian lens (Armstrong 1995), it may

also help to reconnect medicine to more a dynamic awareness of the environment. A danger of this approach, however, is that it could rationalise an extension of bio-political governance by way of the increasing usage of multi-causal complexity-oriented surveillance techniques, which are committed to observing the natural environment and human activity within these spaces.

Research on contested illnesses is another theme in SHI where the natural environment is considered relevant to health research as an entity in its own right (Brown et al 2001; Brown and Zavestoski 2004; Fair 2010; Phillips 2010). As sociologists, of course, these scholars also link their thinking about natural environmental determinants to social processes, such as how contestation occurs in areas of concentrated institutional power. For example, they examine how the medical profession has challenged not only the legitimacy of 'contested illnesses' but also the notion that degraded environments have anthropogenic drivers and that a product of this cycle is the creation of sick people. Carcinogen-induced breast cancer is the most addressed example of contested illness discussed in SHI (Brown et al 2001; Brown et al 2004; Sered and Agigian 2008). New collaborations between lay epidemiologists and sociologists (Brown et al 2004) are identified as a strategy to challenge the power brokers' sustenance of contestations and show that it is through the collaboration of sociologists with people living in degraded environments that make these counter-challenges possible and effective.

The topic of infectious disease emergencies brings the environment back into the social as in Timmermanns and Haas' (2008) article which calls for the formation of a sociology of disease informed by biological knowledge—and not a rejection of it. Generally, work on infectious diseases seems to generate novel insights for medical sociology, such as studies linking high rates of infection to "the poverty of the socio-economic-biological environment", which renders traditional public health approaches to the environment inadequate. The authors argue that a focus on individual risks, single vectors and the control of a specific source of illness does not work when studying health at the interface between the social and the natural world. Rather, a macro-structural approach is needed to look at the conditions affecting "general

exposure to infectious diseases”, with the focus ultimately being on the ‘social’ context (Frohlich, Corin and Potvin 2001; Tausig et al 2006, pp. 842-3). It seems even a social epidemiological approach cannot ignore the natural environment when new disease phenomena are the subject of research. As one author stated, the natural environment is a key element within the dynamic and complex global ecology of “technologic, societal, economic, environmental, and demographic changes; not to mention microbial change and adaptation” driving epidemics, such as pandemic influenza (Stephenson and Jamieson 2009, p. 527).

In sum, across these three journals the use of the term ‘environment’ directly reflects orientations, preoccupations and methodological tools of the disciplinary backgrounds of the authors. Thinking about the environment as a ‘natural environment’—and not only as social, built or physical spaces—is the key to enabling social epidemiological studies to extend notions of the social drivers of health so that the interplay between social and environmental processes becomes part of the analytical gaze.

Biology

The concept of ‘biology’ shifts the focus of this analysis of the journals away from phenomena defined as broadly as context or setting and towards more specific subjects of inquiry. Biology is a good transitional subject as it is still wide-ranging, not only in disciplinary orientation but also in ways of thinking about life on the planet. Nonetheless, because the unit of analysis within biology is the living organism it also requires a greater degree of specificity. How each journal animates ‘biology’ conveys information about what kind of ‘aliveness’ is important to that discipline and what kinds of scales, communities and interactions matter conceptually.

In the journal *Critical Public Health* (CPH), biology is used not so much to reference the biological world or in relation to biological mechanisms (Labonté et al 2005), but in terms of biological imperatives for health (Cook 2009). In these cases, biology is a complex physiologically-rooted set of pathways through which social determinants and biological mechanisms interact to produce health outcomes (Green 2010b, p. 2).

Vulnerability and the cumulative effects of “circumstances and risks over the life cycle” is one way of showing this interplay. An article using evolutionary psychology drew on neuroscience to discuss human evolution (Hankivsky and Christoffersen 2008, p. 274) and the propensity of humans to make damaging choices in their personal, social or planetary worlds, even when cognisant of the contradictions between immediate gratification and long-term wellbeing (Carlisle and Hanlon 2008b).

Genetics was another area discussed (Herbert 2002). While the work on genetics presented in the environment section uses anthropological post-plural theories to make sense of gene-environment relationships, a biological approach to genetics analysed for this section draws attention to the physiological mechanisms of the human-environment interaction. In one article, a discussion of phenotypes shows that an organism’s traits, biochemical properties and behaviour are “modified by environmental characteristics” as well as by other “gene products, that is other proteins” (Ellison and Jones 2002, p. 278). While most sociological studies thus far have focused on the emotional or subjective embodied experience of being situated or embedded in time and space, a biological approach to the study of phenotypes which tracks bodily interactions with the environment along a three way pathway of gene-gene, gene-environment and the interaction between the two (Ellison & Jones, 2002) offers sociology a new way of seeing.

Predominantly, however, in CPH articles the biological is contrasted with the social in the project of understanding and explaining how these binaries are put to work in medicine and in society, leaving, for the most part, the biological dimensions of the natural world or nonhuman subjects outside of the discussion. Thus, the biological subjects tend to be humans and when physiology is discussed, the focus is on human biology and illness (Thurston and Vissandjée 2005). The tensions between biological design and human social activities (Cook 2009), contrasting at times the work of biological ‘hardwiring’ with that of socio-cultural and experiential ‘soft wiring’ (Carlisle and Hanlon 2008b, p. 264), is another strand in the literature. One article also looked to the future using a potentialist notion of biology as a counterpoint to biological determinism (Thurston and Vissandjée 2005, p. 232), a framework which has

historically been co-opted within oppressive social-theoretical projects such as eugenics. A common thread that runs through these articles is a critical theoretical engagement with their subject matter even though the articles themselves address an array of subjects from a variety of disciplinary backgrounds.

In the *Journal of Epidemiology and Community Health* (ECH), running parallel to the research articles, are pieces reflecting on the formation of the Social Medicine discipline. Central to the story of the discipline is its challenge to the dominance of biologically- and chemically-driven approaches to health. Using sociological theories, engaging with the psychosomatic and social aetiologies of disease, and studying health at the scale of the community (and not only the individual) were three important ways in which these challenges were made and through which the discipline has been articulated (Acheson and Shannon 1979; Williams 1979, p. 4). Williams clarifies that the contributions of sociology to social medicine were “not so much a challenge to epidemiology” as a “challenge to the role of medicine—and, behind it, the role of biological and chemical sciences—in the field of social medicine” (1979, p. 4). A critique levied against sociology, however, is that it does not sufficiently consider the biological bases of health (Vineis 1998, p. 616). Epidemiology has traditionally offered a middle ground between the two perspectives (Vineis 1998, p. 617); however it is not exempt from challenge either, with one issue being how to expand definitions of health settings so as to bring the social and the environmental into interaction not only conceptually but also methodologically. The tension between ‘risk factor’ and ‘social’ epidemiology, which is in part a question about how to work with “social and biological phenomena as determinants of population health” (Krieger 1999, p. 678), is an example of the kinds of debates occurring.

Rooted in yet another disciplinary framework, *Sociology of Health and Illness* (SHI) offers to academic conversations material on biology which is predominantly social constructionist (Armstrong 1985; Bury 1986; Bartley 1990; Bakx 1991; Bendelow and Williams 1995; Williams 1995; Williams 2000; Davidson and Smith 2003; Armstrong 2006; Phillips 2010). The relationship between nature, biology, and the social are often discussed in relation to the distinctions drawn between the social and natural sciences,

which can accrue a certain status of ‘facts’ even within broadly social constructionist frameworks (Armstrong 1995; Carter and Michael 2003; Davidson and Smith 2003; Armstrong 2006). Relatedly, the role that sociological insights can and should play in medical and public health theory and practice is a theme running through these constructionist informed critiques (Kelly and Field 1996; Mizrachi, Shuval and Gross 2005).

In work grappling with the framing of the biological within social studies of health, the contributions of early thinkers are regularly discussed. For example, one debate suggests that Talcott Parson’s view of sociology led him to bring together a functional consideration of the health services with the social aspects of illness experience, which is a reflection of the state of the organism as both a biological system and a social one (Timmermans and Haas 2008, p. 660). Critiquing this approach, however, the authors allege that the Parsonian approach reifies the distinction between “the sociological study of illness” and “the biological disease” with the legacy being that “social scientists have become mainly interested in the experience, culture, and social structuring of illness while bracketing the biological bedrock of disease” (Timmermans & Haas, 2008, p. 660). Timmermans & Haas call for a sociology of disease which tackles, head on, the relationship between illness and disease and fully embraces the biological activities of organisms.

Consideration of Marxist thought is another theme as are critiques of his work, with one example being an article on Timpanaro and his responses to Marxist thought. The author observes that “an emphasis on reality as socially constructed leads to a wilful and arrogant evasion of the extent to which human life is fragile and transient—bounded by the continuing determination of natural forces over which we can have no complete control” (Barrett 1981, p. 337). Challenging Marx’s definition, Timpanaro asserts a materialism in which natural and biological boundedness are highlighted as different from dialectical materialism:

By materialism we understand the priority of nature over ‘mind’, or if you like, of the physical level over the biological level, and of the biological level over the socio-economic and cultural level; both in the sense of chronological priority (the very long time which supervened before life appeared on earth, and

between the origin of life and the origin of man), and in the sense of the conditioning which nature still exercises on man and will continue to exercise at least for the foreseeable future. (Timparano in Barrett 1981, p. 338)

Timparano also refused to embrace 'biologism', the tendency to reduce the social to biological determinants, as he believed the concept underestimates the function of the socio-economic structure (Barrett 1981, p. 340). A critique of Parsons and Marx is interesting to this thesis as well, as would be the work of other foundational thinkers, because in Chapter One I turned to these earlier thinkers for instruction and reflected upon the urge to delve into the past for clues of how to get unstuck from the present in order to think differently about the future.

There seems to be a delicate balance between trying to ensure that the future is built on a reified notion of the bounds of sociology and building a contemporary form of sociological analysis which scrutinises the idiosyncrasies and particularities of the present moment. Bury's work stands as a call to attend to the present moment in this way. He cautions against theoretical treatments of the biological which "disguise the actual struggles and consequences that surround the production of legitimate knowledge" within biomedicine (Bury 1986, p. 146). He also finds problematical research which treats social contexts as the primary focus of enquiry (Bury 1986, p. 151). In addition, Bury argues that a weakness of social constructionist approaches can be a tendency to not address relativism seriously which can lead scholars to inadequately appreciate the role played by 'world historic forces' and 'nature'-- preconditions of social life which act as "constraints over what constructions are possible and what are not" -- in the construction of reality (Bury 1986, p. 153).

As discussed previously, a new trajectory is imagined by Timmermans and Haas, who criticise the reluctance of sociologists to "tackle disease in its physiological and biological manifestations" (2008, p. 659). The authors assert that it is now time for medical sociologists to look at "the pathways, processes, and mechanisms of the dynamic interplay between biological health and social life" (Timmermans and Haas 2008, p. 661). This, the authors argue, will help address the 'gaping analytical holes' that currently exist in research, which is averse to looking at the biological factors of

illness or, at best, treats the genetic or biological as a 'fabrication' of conditions, leaving the biological dimensions of disease in a 'tightly closed black box' within sociological research (Timmermans and Haas 2008, p. 663). Pointing to advances in this project, Timmermans and Haas also identify areas where the biological and the social are in dialogue (to date more often outside of medical sociology than within it), such as in the area of biological citizenship which became salient, for example, after the Chernobyl nuclear disaster. Other areas include sociological reflections on bio-indicators and biomarkers in research; psychobiological processes; the use of biological specimens; the identification and study of biosocial mechanisms and the challenge of looking at them within various social contexts, for example that of racialised activity; and, the production of new disease phenomena such as the iatrogenic diseases which are emerging as pathogens become resistant to drug therapies (such as antibiotics or HIV drugs) (Timmermans and Haas 2008; Brown and Crawford 2009). In sum, even though biology is the study of life and living organisms social studies of health, with their focus on abstract theoretical concepts, continue to be challenged by how to approach theorising biological mechanisms.

Climate, Weather, Air, Water and Chemicals

Public health is not a discipline in which the natural environment is generally considered central to its mandate; however, dimensions of the natural environment such as air, water and chemicals traditionally do fall under its remit. Using specific search terms such as climate, weather, air, water and chemicals is one way work on 'natural environmental' or 'ecological issues' can be observed. Increasingly, the sophistication of this research is in its attention to multiple factors, pathways, and scales (ranging from the particulate to the atmospheric).

The approach taken in the journal *Sociology of Health and Illness* (SHI) offers a contrast to the epidemiologically driven work more traditional in public health. In SHI, the earth's elements (such as air, water and chemicals) and processes (such as climate and weather), come to life in texts discussing Hippocratic medicine and holistic medical cosmologies. Climactic factors such as wind, cold, heat and humidity are discussed, for

example, in the Barefoot Doctor's Manual and refer to the Hippocratic beliefs about the humours and their role in producing illness (Bendelow and Williams 1995; Sered and Agigian 2008, p. 7). Studying pain through embodiment is another example as the work reaches back to reference Plato and his declarations that "the twin passions of the soul [are] the results of the interactions between earth, air, fire and water" (Bendelow 1993, p. 276). Although not also studying the loss of holistic frameworks in medical theory, the work on respiratory illnesses centrally acknowledges the natural elements in the disease triggers. For example, a study on surviving childhood asthma identified warm-blooded pets, dust mites, hot dry days, pollen, being outdoors in summer, mould, and damp houses as health determinants. Carcinogenicity in the environment was another other way that chemical compounds were brought into the analytical gaze (Jackson 1994; Brown et al 2004; Klawiter 2004; Lupton 2005; Coxhead and Rhodes 2006; Fair 2010; Phillips 2010) and in these texts the chemical environment is carried through the analysis. However, often in these cases, when pathogen, organism, animal, and/or climate is invoked, they tend to be left as static concepts—unmoving, lifeless indicators where something 'social' is going on within a biological and chemical setting which is just beyond the analysis (Prout, Hayes and Gelder 1999).

As in other journals, in SHI work on chemicals and health often refers to the element of air, for example in relation to smoking (Oakley 1989; Coxhead and Rhodes 2006; Holdsworth and Robinson 2008; Bell et al 2010; Bottorff et al 2010). However, here air is a medium through which the smoke passes with the focus being on the social dynamics playing out in the smoke. This is a different focus from operationalising the air as an element of the natural environment, which highlights the ways in which the natural elements like air link people—even in built environments and in the midst of social interactions—and in this manner make the natural world an important factor even in socio-economic health dynamics. A similar observation holds for the operationalisation of water, which occurs in SHI primarily in relation to sanitation, poverty and health, including their expression in global health, oral health and midwifery (Blane 1985; Benoit 1989; Mumtaz and Salway 2007; Prus 2007; Reznik, Murphy and Belgrave 2007; Exley 2009; Carter 2010; Boiko et al 2011). For example,

Tausig and colleagues observe that "high rates of infection in the developing world are directly attributable to contextual factors such as contaminated water supplies, non-existent sanitary systems and the absence of modern healthcare resources" (2006, p. 842).

While often present in the literature, climate change did not materialise as a key concept in and of itself, but rather always as a stimulus for some other form of thinking. For example, climate change was often referred to as an important contemporary issue. However, it was not referred to as a global threat to health but rather for its role in generating panic, fear and insecurity in the public (Seale 2003) and as a phenomenon illustrative of social relations of power, as in the case of Seale's reference to climate change as a discourse exemplifying the work of powerful organisations in constructing dominant discourses and subjugating knowledges of the less powerful (Seale 2005). In a similar vein, Brown and Zavestoski observe that the Bush Administration's opposition to the scientific consensus on global climate change is an example of efforts to "hide the politicisation of the policy process" (2004, p. 681). This approach is taken not only in journal articles but also in book reviews, where a good proportion of the references to climate change occur. Climate change is used as a metaphor as in the claim, "obesity has been referred to as the climate change of public health, because it is big, complicated and difficult to turn around" (Rayner 2010, p. 824). However, book reviews are also a mechanism for introducing climate change as an area of study for sociologists to contemplate (Green 2010a). Similarly, a review of the Intergovernmental Panel for Climate Change's (IPCC) facilitated a discussion of predictions of the impacts of environmental damage and shed a sobering light on the ability of the international community to meet health targets such as those laid out in the Alma Ata's 'Health for All' (De Vogli 2008).

What an analysis of these journals also shows is that linking health with the elements (such as air and water) and environmental factors and processes (such as climate and weather) is something epidemiological studies have been doing for decades. It is also a relationship acknowledged within medicine and social theory, with the additional consideration of holistic frameworks in critical social studies of biomedicine and its

work on elemental environmental health determinants. These trends underscore the ability of epidemiological studies to make visible relationships between context and health, and the value of operationalising the natural environment and its constituent elements, such as air, if the goal is to generate insights into health-environment (inter)relationships. The failure of researchers to be more critical of the role of human activity in producing human-environment health injuries is also an issue that comes to the fore. For example, hundreds of articles in the journal ECH address the links between the contamination of air, water, soil, food and the atmosphere, and the findings are supported by rich epidemiological data. These data makes sense in that environmental epidemiology can be defined as “the study of determinants of the distribution of disease that are exogenous to and nonessential for the normal functioning of human beings” (Goldberg 1999). Despite the fact that many of the chemicals that are damaging health today are xenobiotic (human-made), the human activities producing a particular chemical being studied and its role in producing a particular health injury are not being operationalised as variables in these epidemiological studies. This is a methodological shortcoming when read against other material in the journal (and of course external to it) which shows that human (economic) activity and modern industrialised lifestyle (behaviour) are (often indirect) variables which are significantly driving human health injury outcomes and need to be accounted for in present-day research (see Mackenbach 2007). Acknowledging this reality creates a set of challenges that increasingly seem to be addressed within environmental and ecological epidemiology (Torres and Monteiro 2002).

Environmental Health

Moving between epidemiological and theoretical approaches to the study of the natural world and particular natural elements (as in the last section) and keeping a sense of coherence as the scales and gazes change is already a challenge. However, in a sense, the concept of environmental health embodies these kinds of movements as well, as this analysis will show. Environmental health refers to the concept, the discipline and/or the organisational structures responsible for the care of the environment as it pertains to human health, particularly in relation to issues such as

the food supply. Little mention is made of 'environmental health' within the journal *Critical Public Health*. One article on changes in public health in the UK since 1997 discusses the vision of the Chief Medical Officer's report to strengthen public health through the cultivating a multidisciplinary public health workforce, which would include expanding the role and number of public health staff who may come from a variety of "professional backgrounds such as public health sciences, environmental health, social science, medicine, nursing, health promotion and dentistry" (Wills and Woodhead 2004, p. 8). In an article which included opinions from environmental health participants on building capacity in new primary care organisations the message was that within efforts to build capacity in the Public Health sector the relationship between public health and environmental health was not being addressed (Chapman et al 2004). And in yet a handful of other articles, environmental health issues and implications were identified although not elaborated upon, such as one on the "environmental health implications of an industrial food supply" (Dixon and Banwell 2004). In two articles— one about Regional Health Management Teams in Windhoek, Namibia (Stewart-Brown 2000) and the other a study mentioning the important contribution environmental health could make to restoration initiatives in Iraq— the relationship between public health and environmental health was assumed to be integral to health management.

In a few other studies, environmental health workers were included as part of the research cohort (Boydell and Rugkåsa 2007; Balogh, Whitelaw and Thompson 2008). In one case, for example, environmental health practitioners who participated in a workshop shared that in their "environmental health teams they did not feel they were regarded by the PCT medically orientated public health agenda as making a significant contribution to public health, even though issues such as noise pollution were important community public health issues" (Shaw, Ashcroft and Petchey 2006, pp. 79-82). While the focus of this article is on relationship building and not on environmental health *per se*, this quote points to some of the issues faced by people when trying to build conceptual, organisational and practical connections between environmental health and public health sectors—and the importance of organisational support in facilitating these efforts. That these are two professions with relatively

distinct remits within the larger health sector contours the contexts within which interdisciplinary dialogues occur, perhaps sometimes obscuring the more theoretical intersections between health and the environment and which require that disciplinary boundaries, remits, methodologies and technologies be set aside from time to time to focus on the bigger picture.

A few works call for a shift in public health. One wanted an end of the 'sewage principle' and a move towards the 'ecological principle' as the structure of new public health frameworks capable of facing the complexity of new, interactive global health risks. Some thought of it as an elaboration—a development into a more ecological understanding of public health—while others suggested the adoption of an Ecological public health framework (Thurston and Vissandjée 2005; Hanlon and Carlisle 2010). Views on what an ecological system is and how it should be expressed within the arena of public health ranged from suggesting that an ecological model views sustainability and health as reciprocal, to an approach that views the various dimensions of life (e.g. spiritual, material, social, physiological, environmental, behavioural) as interdependent and natural systems as having limits (Hanlon and Carlisle 2010). A critical and feminist approach suggested that an ecological model should not only be non-reductionist but also draw attention to contextual levels (micro-, meso-, and macro-levels) and develop short, medium and longer-term views of issues and responses to them (Springett, Whitelaw and Dooris 2010).

For others, making the links between social, psychological, biological and environmental factors as determinants of health was critical (Thurston and Vissandjée 2005, pp. 230-232). Springett et al. suggest that in order to achieve sustainable human communities, ecosystem organisation must be characterised by "interdependence, cyclical processes, cooperation, partnership, diversity, flexibility and coevolution" (2010, p. 277) and raise questions about what radical shifts will need to occur within the social world and public health as a science and a practice more particularly, in order to play a role in creating health and wellbeing. Others spoke about 'ecosystem health' as "ecological stability and sustainable resources" (Hancock, 2008, p. 443) emphasising notions of stability (Hancock 2008) and sustainability (Kellehear 2007), as

well as threats to sustainability such as the “loss of ecosystems and biodiversity” (Hanlon and Carlisle 2010, p. 300). There were those who also advocated for an elaboration on the ecological model of health, such as by bringing it into conversation with Bronfenbrenner’s (1986) systems theory, Howard and Hollander’s (1997) work on theories of social cognition, social exchange and symbolic interaction (Thurston and Vissandjée 2005). Hanlon and Carlisle, great proponents of an ecological embrace within public health, underscore that the ecological and environmental challenges of our age herald obstacles but also opportunities, including the chance to reframe “some of the debates which inform public health policy” (2010, p. 305).

As presented in the journal *Epidemiology and Community Health*, articles referencing environmental and ecological health as approaches to take within the public health framework were in one sense proposing an elaboration upon public health practices. The suggestion of using “environmental health problem solving” within public health was a suggestion that “public health entities should implement sustainable intersectoral interventions” that are “collaborative” and “preventative” (Cassady et al 2006). In an article on water borne illnesses, Cassady et al. suggest that typically, environmental health strategies focus on “a model of compliance with federal and state regulations” and that there are initiatives underway “to improve environmental public health practice” in the USA, such as an undertaking by the Centers for Disease Control and Prevention (CDC) which is:

developing integrated systems approaches to improve responses to and prevention of emerging environmental health problems. Rather than concentrating on enforcement of regulations, a systems approach attempts to understand the interactions of different parts of an operation and identify underlying vulnerabilities in the system. Applying this approach allows the collaborative team to better understand the direct cause of illness as well as the environmental antecedents of disease outbreaks. (Cassady et al 2006, p. 672)

A systems based approach to environmental health, the authors conclude, will help build insights into the interactions of environmental factors which will include looking at the relationship between the biological, chemical and physical agents which

produce ill-health through to the water systems which have to consider the human element in their construction and maintenance (Cassady et al 2006, p. 674).

Other directions proposed included using public health models to study the natural environment and looking at social health through the lens of ecology (McLaren and Hawe 2005; Nurse and Edmondson-Jones 2007). This call is also about developing public health theories, methods and practices with an invigorated sense of responsibility for, and capability to address, the environmentally driven population health challenges that characterise the contemporary era. Reflecting on the question, 'what is the relationship between human ecology and public health?' the authors suggest that an ecologically minded public health approach would move away from "a simple univariate model of action-reaction, or at most, multilevel relations" with clear directionality to a study of the complexity of interactions in ecology and modelling that expresses this multidimensionality (Torres and Monteiro 2002, p. 82):

An ecological perspective encompasses context in the broadest sense of the word, to include physical, social, cultural and historical aspects of context (including trends at the local and global level such as globalisation, urbanisation, and large scale environmental change) as well as attributes and behaviours of persons within. Moreover, primary themes of an ecological analysis include interdependence and mutual interaction among persons/organisms and settings, as well as an emphasis on studying behaviour in natural (non-experimental) circumstances. (McLaren and Hawe 2005, p. 6)

In other words, a public health framework "brings an ecological approach to relating to the interaction of the multiple elements", not only because public health itself addresses so many components of life, but also because there is attention paid to the drivers, enablers and influences that play out in systems which produce social health problems (see Nurse and Edmondson-Jones 2007, p. 557).

In work that uses ecology as a natural systems concept, there are also challenges for public health. Reporting on a study on climate variability and Ross River virus (RRv) transmission, one paper has made a contribution to the literature because of its use of ecological principles but has also generated challenges:

Limitations of this study must also be acknowledged. Firstly, the ecology of RRv is complex. Many factors, such as virus, vector, host, or environmental

variations, are involved in the transmission cycles of RRv. Temperature, humidity, virus strain, mosquito population densities and survival, human behaviour, population immunity, and housing characteristics, all contribute to and interact in the RRv transmission cycles. However, the availability of most of these data is limited. Secondly, the quality of notification data might vary over time. It is difficult to quantify the potential impact of any such variation in data quality. (Tong et al 2002, p. 620)

Other issues discussed, again related to issues of complexity, were how to help public health researchers who have shied away from certain kinds of challenges to tackle challenging questions such as how to work across multiple spatial and temporal scales, nested hierarchies of socioeconomic and biophysical environments and feedback loops between phenomena, as used in disciplines such as ecology (Paradies and Stevens 2005, p. 2013). Given that public health considers the social as well as the environmental dimensions of population health, it is a discipline well positioned to draw upon a variety of theoretical frameworks to develop greater ecological thinking (McLaren and Hawe 2005). Already work from other disciplines that look at issues of interaction, integration, and interdependence are being reviewed.

Authors who work directly on environmental health movements publishing in *Sociology of Health and Illness* include Phil Brown and colleagues who theorise environmental and embodied health movements. Their work offers explicit and detailed identifications of physical, biological and chemical determinants of health injuries when they highlight the chain of carcinogenic environments, female biology and anatomy, the power of large industries, the knowledge of lay epidemiologists and the importance of social and environmental movements such as the environmental and social justice movements (Brown and Zavestoski 2004; Tausig et al 2006). Another area of research which medical sociologists have contributed to is the critique of compositional, contextual and social epidemiological methodologies. The critiques have been developed in order to ensure the inclusion of social factors in epidemiological studies and, relatedly, for example, the study of complex interrelationship between sociologic and biologic factors. Acknowledging that to date individual-level factors have often failed to account fully for the rise and prevalence of non-infectious, chronic diseases, many public health researchers are also returning to

public health's origins and are beginning to reconsider the role of the environment (often within the framework of 'studies of context') (Macintyre, Ilaway and Cummins 2002) but sometimes in ways more oriented to environmental health frameworks than before. In these cases, when environmental epidemiology, environmentally integrated health analyses, Environmental Impact Assessments (EIAs), Social Impact Assessments (SIA) or Health Impact Assessments (HIA) are used, context is seen to be more than structure and the focus is not only on treatment but also on long-term prevention. For example, one of the primary purposes of HIA is to raise awareness amongst decision-makers of the relationships between health and physical, social and economic environments. A secondary purpose is to help decision-makers identify, assess and optimise possible health outcomes. A third dimension of HIA is to help those affected by policies to participate in policy formation and contribute to decision making (Elliott and Williams 2008, p. 3).

Ecology, Ecosystems and Biodiversity

While only cursorily mentioned in *Critical Public Health*, ecosystems were referred to in one article as the 'earth's ecosystem' with people forming "an integral part of" this system (Springett, Whitelaw and Dooris 2010, p. 275). Discussions of ecology were often linked to work on risk society, with ecological risk patterns being identified as characteristic of new global health challenges, such as pollution and environmental disasters as well as the health impacts of (irreversible) damage to ecosystems (Nutbeam 2008). The ecological consequences of human disconnection from the ecological world was also discussed as well as the consequences of (uncontained) human demands on the ecological world, such as the stressors exponential population growth places on natural resources (Hanlon and Carlisle 2010) or the loss of biodiversity which is often the result of industrialisation (Hanlon and Carlisle 2010; Springett, Whitelaw and Dooris 2010). Ecology also served as an opportunity to illustrate not only risk and tipping points but also resilience and the benefits of social innovation: "We are in a race of the tipping points: will we reach the social tipping points favouring a deep cultural and political commitment to sustainability (and life) in time to avert the worst of the ecological tipping points we are being warned of almost

daily?” (Poland and Dooris 2010, p. 239). A related and also infrequently addressed concept is biodiversity which is a global public good, in other words, something that benefits all countries (Labonté 2008). Biodiversity loss was also discussed as an environmental pathway that links the local and the global, not only in terms of the environment but also in terms of activities such the interaction between trade liberalisation and biodiversity loss (Labonté and Torgerson 2005).

In *Epidemiology and Community Health*, ecology is a term that tends to refer to “investigations of the distribution of health and its determinants between groups of individuals” which are typically undertaken when individual level data is not available or desirable as in the case of wanting to understand whole population dynamics (Goldberg 1999; McLaren and Hawe 2005). In addition, the majority of texts identifying themselves as ecological were in fact studies of the ecology of infectious disease, violence prevention, physical activity and environmental health (Nurse and Edmondson-Jones 2007). As would be expected, the biological sciences define ecology as “the science and relationships between organisms and their environments” and an ecosystem as “an ecological community together with its environment, functioning as a unit” (Nurse and Edmondson-Jones 2007, p. 557). The latter approach, when applied to public health research and response, is similarly concerned with health at the scale of groups and is also interested in whole population dynamics, with the additional aspect being that the ‘whole population’ is a framework that extends beyond the human realm to focus on ecosystems which are also seen to include all the biotic and abiotic dimensions of their ecosystems. It is, in other words, a theory of systems and requires a reorganisation of conceptual frameworks as well as values (Duhl 2004). The framing of systems appeared again in an article where complex systems were discussed, typically these were ecosystems in work referring to the natural world and the global economy in social studies (Bettcher and Lee 2002).

In other work, an ecological approach placed the focus on the natural ecosystem, but then used these frameworks as metaphors and analogies, “to help understand human systems and environments” (McLaren and Hawe 2005, p. 6). McLaren and Hawe show that “the more complex the phenomena being observed, the greater is scientists’

dependency on the use of metaphoric language to describe it. So while metaphors are seen as necessary to communication, the danger is that the careless or partial application of metaphor invites misrepresentation” (2005, p.6). The authors cite the use of ecological language by sociologists associated with the Chicago School after World War One to inform their metaphors (McLaren and Hawe 2005, p. 6). All in all, while out of fashion for some time, an ecological way of thinking is again garnering interest (Krieger 1999; Krieger 2005).

One of the central terms within ecological approaches to health is ‘ecosystems’, which highlights systems thinking and interdependence of each component of the cyclical system and upon the whole as maintaining homeostasis within the system in ways fluid enough for the pathways through it to act as conduits for energy travel. Sustainability is central to a healthy functioning ecosystem (Nurse and Edmondson-Jones 2007, p. 557). However, an observation made by one scholar is that the interrelations between humans, their actions and the systems which produce environments tend to be regarded as ‘unavoidable’ or ‘unforeseen’ consequences of economic and cultural change—they are ‘normalised’. Making the “factors that are part of our ecosystem legitimate objects for public health research and practice” is an important theoretical and methodological task in the present moment (Torres and Monteiro 2002, p. 82).

A related ecological concept, biodiversity, brings to the discussion of ecology an awareness of ecosystems as well as a concern for the status of other biological beings and communities. The focus in the literature is overwhelmingly on biodiversity loss, which is described as one of “the four important categories of global environmental change, each of which form potential, although partly or largely, unknown, threats to human health” (Mackenbach 2007, p. 92). Building awareness through a negative ontology places the analytical focus on a growing absence and explains the counterpoint of positive campaigning as a strategy for awakening proactive approaches to the environment within health research. One of the challenges, however, is the degree of empirical and statistical uncertainty about the actual health effects of biodiversity loss as well as questions about the pathways through which

biodiversity loss leads to morbidity and mortality (Mackenbach 2007). The interplay between political, economic and social activities and biodiversity loss, such as the ways in which biodiversity is eroded through economic activities like primary resource extraction or biopiracy, was another approach described (McKee, Gilmore and Schwalbe 2005). Others discussed how efforts to place an economic value on protecting biodiversity could have positive impacts on health outcomes (Labonté and Sanger 2006).

In *Sociology Health and Illness*, ecology was referenced in relation to ecological studies in epidemiology and issues that emerge within the methods such as the 'ecological fallacy', which highlights that what occurs at the level of the group as a whole may not occur for individuals or subgroups. The possible impacts of interpreting compositional effects on health research were part of this discussion (Curtis and Jones 1998, p. 648). Ecologies of health, infection and violence are all subjects studied using ecological models and discussed in SHI. Natural ecologies and ecosystems are not, however, subjects of significant consideration in this journal. Substantively, reference is made to the ecological effects of certain geographical areas on its residents and the links between environmental circumstances and ecological realities (e.g., contamination) in which poor people live, such as racial and ethnic minorities, refugees and migrant populations (Bartley, Blane and Smith 1998; Nazroo 1998; Brown et al 2004). Ecological niches are referenced in another article as a way to set humans aside from other beings:

Certain aspects of human beings and the societies they create are natural phenomena, species characteristics. However, while part of our nature may be fixed, we are the only species to have escaped from a conventional ecological niche. The unique human capacity for language moulds our individual and collective social being in radically different ways from any other part of creation. (Strong 1990, p. 256)

While this article on psychology, epidemics and the human condition offers insights into how disease epidemic can come to be followed by 'plagues of fear' leading to 'outbreaks of moral controversy and other challenges' it sets up a fundamental dichotomy in the argument between the human and non-human world and beings and sets humans as sophisticated to the point that we dwell outside of 'conventional

niches' and their confines. This move reinscribes frameworks set out within dualistic thinking which place the social and the natural as diametric opposites and, as much of this thesis and the authors cited in it are presented as arguing, mystifies the continued and essential reliance of all human beings and civilisations on natural elements such as air to breath and ecological dynamics which provide the services of food, material for shelter, fuel and so on upon which the most complex human systems are reliant (MEA 2011).

Postmodernism is identified in one article as an approach that allows for a restructuring of space by valuing at once the trends of globalisation and localisation and by extension the ways in which culture and nature interplay, such as through local social and ecological phenomena (Bakx 1991, p. 24). More specifically the notion of 'ecological modernisation' is discussed in a paper on the power struggles that occur when Health Social Movements (HSMs) and CAM challenge the authority of medical knowledge and medical communities. Paralleled with 'medical modernisation', ecological modernisation is used to refer to initiatives where the movements found a middle ground, in this case a moment when "the private sector undergoes a partial greening of production that is monitored and spurred by the state and civil society" (Hess 2004, p. 697).

The ecosystem approach is discussed in one book review as an approach to studying and treating children with a disability by taking their context into account (May 1982) and another reference is made to it in a book review on globalisation, health and the environment: "greater equity and healthier ecosystems" can play a role in creating "positive health outcomes for all" (Potts 2007, p. 629). Biodiversity is mentioned in one article and this is in relation to community acquired and transmitted MRSA infections in which the discursive production within the media of the 'bacterial biodiversity mechanisms' is discussed as being evocative of "sentience and cognition" (Brown and Crawford 2009, p. 515).

Conclusion

This content analysis has shown that presently the journals *Critical Public Health*, *Epidemiology and Community Health* and *Sociology of Health and Illness* are introducing work which considers the significance the natural world plays in producing, sustaining or damaging public health. However, the challenges of this introduction are also evident. Some authors express urgency informed by evidence of the increasing interconnection between human suffering and environmental degradation. Positive messaging and propositions of straightforward concrete actions is one strategy being used to translate the complexity of issues into manageable categories and to rally colleagues to take action.

The issue of vocabulary was pertinent to all the journals as the role a discipline's vernacular plays in influencing how new conceptual trajectories are developed was evident. In *Critical Public Health*, classical public health insights are linked to critical social theoretical observations. Adding the element of the natural environment (and by extension frameworks generated from the disciplines of biology and ecology) brings whole new conceptual containers to the discursive melee. A stepping back and sorting through what is meant by terms such as 'the environment' or 'ecology' and coupled concepts such as 'environment and health' is still needed. In part this is because the terms 'environment' or 'ecology' can carry multiple meanings, which are often unrelated and operate at different scales, timeframes as well as involve different conceptualisations of what constitutes an environmental agent in a given context. Developing a way to speak about natural environmental phenomena, processes and dynamics within public health frameworks is also necessary if population health studies are going to be assisted by tools outside of more traditional public health notions of what an 'environment' or 'ecological approach' is and can be.

Another challenge for public health is to clarify what kind of a resource the natural world is for public health. In social medicine, it is in relation to biology that the links between the environment, the social and health have been developed, and in sociology it is a study of the alienation of the body within biomedicine that offers

insights into the importance of thinking holistically about people as biotic beings in living environments. Theories of embodiment range from interest in seemingly mundane daily rituals and the minutia of lived space through to the physical environment, which can limit people's mobility structurally, physiologically through illness, or emotionally through mental health issues. Issues such as physical disability, chronic pain or invisible disabilities such as anxieties and phobias are states which also make human-environment interactions more vivid because humans, in these states, cannot take human-environment interactions for granted (e.g., the ability to move through natural spaces) or are impacted by the environment, as in the case of asthma, environmental illness such as sick building syndrome, or breast cancer. Through research on Complementary and Alternative Medicine the power of the natural world also enters discourses. In this case, the natural world has the power to heal and building a direct relationship to this world empowers people in ways that the biomedical cosmology does not vis-à-vis healing. These are all highly developed theoretical and empirical research areas within medical sociology and are therefore areas ripe for extending the analysis to more explicitly study health in the nexus between the social and the environmental.

Another well-developed area in the literature that would be a good place to leap from into environmental health thinking is work on biology. As the analysis of the three journals illustrate, each discipline engages with the discipline of biology differently and then within its own disciplinary arena also uses biological concepts within specific kinds of projects. The multiplicity of approaches is valuable to social studies of health, however, because each approach thinks about the biology of an issue differently. Sociology could translate this overview into a more holistic social-biological framework for studying health and illness. Taking up this challenge will also have its trials as social researchers will likely encounter disciplinary boundary work. For example collaborating with biologists will have to be carefully negotiated as previous sociological embraces of biological concepts have sometimes led to biologically determinist and eugenicist scholarship or to the reification of natural scientific paradigms which embrace biomedical models and subjugate the knowledge of alternative medical traditions. Instead of a rejection of biology, however, sociology could reframe the terms of the

collaboration not only by valuing its own contributions equally but also by taking responsibly for its mismanagement of biological knowledge in the past. An incomplete understanding of biology and the usurping of biological knowledge within a social project (eugenics) are a significant part of the problem of using biological knowledge within the social sciences. Becoming more biologically literate will help as will approaching issues through the lens of complexity. Embracing these projects could help medical sociologists think through non-social pathways and interdependencies to illuminate their understanding of the social dimensions of disease. Methodological innovation could help sociologists work in the tension between social constructionism and critical realism so that the materiality of natural processes and spaces can be studied as exerting limits on the social world and at the same time where social activities are analysed as having real effects on natural systems and processes.

Risk, a refined area of sociological scholarship, is yet another discourse that is found not only in social theory but also in medical and public health theory and practice. While following notions of risk is a robust way to move across these disciplinary terrains one contribution this journal analysis makes is to point to the importance of adding to both social and epidemiological notions of risk a multidirectional analysis. Currently risk thinking tends to be a one-way directionality where the end destination is always 'the social'. In risk theory, for example, the focus is placed on how the (degraded) earth threatens human health, instead of more circular notions of feedback loops and resilience which would lead the discussion to include greater concern for social risks to the environment, as well as a study of hidden risks which work unseen over longer periods of time and along indirect pathways before emerging as health phenomena -- an analysis would ultimately reveal the consequences of present day social-nature relationships.

Moving into newer terrain, becoming curious about ecological principles within sociological thought will open up new theoretical and methodological vistas. The concept of ecology is useful for many reasons including that it highlights the need to translate knowledge across disciplines and the importance of developing a shared vocabulary if holistic scholarship on contemporary health and illness phenomena is to

be conducted. Again, the multiplicity of meanings this time given to ecology is an issue. As the content analyses have shown, some articles refer to ecology as a unit of analysis where populations not individuals are considered, for example ecological studies of family violence or disease prevention (and relatedly there are discussions of the 'ecological fallacy'). Other articles brought in a melange of ecological concepts, some theoretical and some methodological, offering an array of analytical scales and conceptual pathways through which to link the social (both human and non-human) and the ecological. The heterogeneous uses to which ecology is put can benefit sociology in much the same way that the concepts of biology and the environment can. Whether applied to material phenomena or used metaphorically, however, a unique quality of ecological thinking is that it tends to require the use of other concepts such as interaction, integration and interdependence. When ecology (through ecosystems) is used to think about health it also raises for consideration issues of uncertainty, complexity, responsibility and the role of the precautionary principle.

One purpose of this systematic content analysis is to not only evaluate where theory is at presently but to use this as a foundation upon which to think about new possibilities. Granted, public health, community or social health and medical sociology academic literature is only beginning to address the environment as relevant to health and is often defaulting to a social framework to conduct this thinking. What this analysis has shown however, is that such an approach only allows for a partial engagement with the natural world. A strategy for moving forward is to embrace the myriad, uneven and sometimes incompatible ways different disciplines use a concept such as ecology or biology or the environment to make sense of health issues. This raises the issue of disciplinary gazes, including their strengths and limitations, the importance of transdisciplinarity, and the limits to comprehending the links between health and the environment not only because of politics but also because of conceptual and theoretical limitations. In addition, as the theoretical literature presented in Chapter One and the public health governance literature discussed in Chapter Three has shown, politics also plays a role in how disciplines and social institutions are approaching the 'environment' as relevant to health. When 'the

environment' (or other concepts in this analysis such as ecology) are folded into these social processes, it becomes something other than a natural phenomenon; it becomes a socio-techno-administrative construct which is being constructed and contested within social relations of power to achieve particular ends. The environment that is 'natural' and at the same time 'something other than itself' offers one way of thinking about the construction and contestation of the environment as related to health. For a critical analysis, this aspect of the production of environmental health determinants as they are being cultivated within medical, political and social power structures and relationships is important to track.

In the following two chapters, I move from analysing theoretical data to the analysis of personal accounts of working on health at the nexus between the social and the environmental. My intention now is to reflect on the links between personal beliefs and professional practices as they play out in the field when the natural environment is acknowledged as a health determinant (Chapter Five) and when ecology is considered a helpful framework for thinking about health and the natural environment (Chapter Six). While I continue to consider the relevance of theory and governance mandates to participants' work I look for it within their narratives of everyday work practices.

Chapter Five

Constructing and Contesting the Environment in Public Health

How people conceptualise the environment and how their ideas about the relationship between the natural environment and humans shape their work on public health are the focus of this chapter. Rooted in data gathered through sixty in-depth semi-structured interviews, this chapter offers insight into how ideas about the natural environment impact stakeholders' professional practices and experiences of working in the health sector. The first section discusses instances when research participants identified the environment as a longstanding subject within public health by citing cases from history. The second section presents data on how participants define the concept of the environment and draws attention to the variability of ideas at work, noting two predominant and recurrent discourses: the environment as context, and the environment as agent within health discourses. Ideas about the relevance of the environment to public health are discussed in the third section, which is divided into two further sub-sections to reflect the data: (a) the environment as a contested issue within public health and (b) how individuals are putting the environment to work in the public health sector.

As introduced in Chapter Two, the research participants in this study are organised into three stakeholder groups: 1. employees of the Health Protection Agency (HPA); 2. people working in the UK public health sector outside of the HPA, for example in Private Care Trusts (PCTs) (UK PH); and 3. people working in countries other than the UK on public health and the environment issues (Intl). While there is variability between the groups, there are also some similarities, particularly in terms of the demographic of the participants who had the most to say about the relationship between health and the environment. A matrix analysis of respondents' transcripts shows that: 1. mid-career people were three times more likely to address the environment in a substantial way in their interview than early or late career people; 2. people with a postgraduate degree were seven times more likely to substantially discuss the environment, while those with only a bachelor degree offered the least input on the subject ; 3. people employed in university settings were most forthcoming

in discussions on the environment and health, with public health employees and managers in the public health sector also making significant comment on the environment—double that of public health consultants; and finally, 4. those with international work experience were approximately twice as likely to address environmental issues than those without this experience. In sum, it is mid-career professionals, predominantly working in academic research settings or in public health management positions, who hold doctoral degrees (regardless of the discipline) and have had international work experience who were most concerned with and articulate about the relationship between health and the natural environment.

Comparing the transcript analyses with demographic data in another way, it also becomes evident that overall research participants can be split into three groups based on their general worldview, namely: those who do not see the environment to be relevant to human health; those who sense the importance of the environment but do not yet know how to translate this knowing into theory or practice; and those who firmly believe that human health is intrinsically linked to the natural environment and endeavour to express this view through their public health work, whether or not they are successful. See Appendix One for an overview of the demographics of the research population.

Historical Legacies: Public Health and the Environment

The message that the place of the environment within public health cosmologies has changed over time is a feature of governance texts as is evidenced in the analysis of the development of the environmental health policy arena (Chapter Three). Attention to this subject also runs through the academic literature analysed. In interview, particularly when participants talked about the environment as something more than the built milieu, they often focused on how the relationship between humans and the environment has been changing—often eroding—over time and how a loss of sustainability is the source of many contemporary environmentally driven health problems. Examples given ranged from the proliferation of air pollution and related health injuries during the Industrial Revolution in nineteenth- and twentieth-century

Britain through to the loss of small scale, family-run farms, such as on the British Isles where hundreds of years of harvesting kelp and seaweed has given way recently to the industrial fish farming of salmon and trout and with that the ushering in of novel pathogens and diseases. Parallel examples were also given from other parts of the world, particularly in relation to the loss of traditional food production systems and the rise of illness and disease.

Over time, participants noted, the importance attributed to the environment as a driver of illness events has waxed and waned within public health frameworks. One environmental technician spoke of the Great London Fog of 1952, which precipitated the introduction of Clean Air Acts and marked a time when the environment was clearly acknowledged as a public health driver. Recalling his entry into the workforce in the 1970s, a microbiologist shared, “nobody gave a damn about the environment. You know, it was just something you lived in and we didn’t worry about what we did to it, it was still going to be there” (HPA-MB-M19). Read together, the interviews may point to the efficacy of the Clean Air Acts in reducing environmentally driven health threats to the point that concern about them faded away. However, there is also a sense conveyed that the conditions of the present moment can be taken as the *status quo* of all ages and this observation points to a historical or generational amnesia about past conditions that makes it challenging in the present moment to draw upon insight and wisdom accrued in the past. The ‘nobody gave a damn’ quote also raises questions about the formation of social and cultural discourses, the implications of the recall and attention span of generations—whether of people, organisations or governments—for constructing contemporary theory and practice, and the significance given to the continuity and discontinuity of attention to the links between health and the environment from one era to the next.

While no one participant offered a comprehensive theoretical explanation for the ebb and flow of attention paid to the environmental drivers of health injuries, one factor identified by many was the wealth of a country. For instance, one participant correlated an increase in prosperity in Britain over the last few decades with an increase in research funds available for studying the impacts of industrial and

technological developments on the natural world and human health, and in turn the support for improvements in technology has helped to restore the quality of air, water and food. A nation's wealth is produced through a variety of local, regional, national and international relations and, therefore, is always intrinsically linked to social forces, dynamics and relations of power. The quotation below brings together observations about history with economic ones and points to the ways in which these two forces sometimes meet in the arena of public health:

In the 1800's, when air pollution really started kicking off, it was seen as a threat against public health. What's interesting is it was also strongly about nuisance; it's not actually been only about what the physical impacts are, but also about the effects that nuisance has on health. (UKPH-EH-M04)

The legal tort on nuisance is that it is “an act or omission which obstructs or causes inconvenience or damage in the exercise of rights common to all” (NuisanceLaw 2011) such as the right to clean air. The way this issue has linked public health activity with law is a good example of how social components (the health sector, government, law, and the public) knit together in and through the public health sector. This passage also illustrates that social, and not just medical, processes tend to be at work when determining if an environmental issue or incident has an explicit public health effect and then defining what that effect is, how formally it can be addressed and how care for population health in relation to it can be enforced. Approached differently, this respondent's observation reminds us that environmental components, such as air, become visible when certain groups within particular relations of power identify them as public health issues warranting organised social response.

While the Western world is now firmly located in a post-industrial era, class divisions and social inequalities persist. Participants' historical observations considered both direct and indirect links between historical activities and present day inequalities. The role of leadership in framing and responding to the links between the environment and health was one refrain:

You think Christ almighty, when are we ever going to actually wake up because this stuff is not getting any easier. It is much more difficult than probably most of these people who are actually making the decisions can even come close to conceiving ... The public health leadership, for instance, needs to be planning

for and running models about what is going to be going on in five or ten years and have a public health structure in place that will address them. If they don't then they are going to be reacting and they are not going to be reacting fast enough to problems that are really large and will result in a lot of human suffering. (Intl-SS-M06)

Repeating the view that environmental health issues expand and intensify making them even more relevant in the future, many like the respondent above argued that concerted public health attention is required today. Waking up—whether personal, institutional or social awakening—was a discourse running through the interviews, as was how to precipitate waking up.

Defining the Environment

While history was important to some, research participants were primarily concerned with the current moment. Looking specifically at what the environment is to participants today and how it is relevant, or not, to research participants' notions of what constitutes a public health issue is the focus of the analysis that follows. This discussion is organised by the three stakeholder groups and begins with an analysis of the HPA participants, followed by attention to the UK PH group and concluding with brief comments on the perspectives of the international cohort.

As an organisation, the HPA generally frames environmental drivers through the lens of the discipline of Environmental Health and approaches modelled by organisations such as the Chartered Institute of Environmental Health (HPA-R-M16). How the environment comes into the HPA remit is another factor some participants took the time to describe. For example, if an issue such as a flood is identified an environmental emergency of scale, it is filtered through a national Science and Technology Advisory Cell (STAC) and the HPA is responsible for the public health dimensions of the event unless it is overall deemed a public health emergency. In such a framework, the environment is broken down into immediate risk components and interpreted through how the HPA responds and not the environmental dynamics of the flood. A classic mandate for responding to floods within the HPA, therefore, is to ascertain three things: the immediate risk of chemical contamination; the risk of exposure to

chemicals of people in the water; and what the HPA can do about it (HPA-CDC-M09). This focus reflects a 'pragmatic definition' of the environment and a response based framing of 'what matters' to public health (as discussed in Chapter One). In other words, it reflects a traditional public health model, a framework at the front and centre of many respondents' minds when discussing the environment:

There are just three things you need to know in environmental health which is source, pathways and receptor and so you may or may not confirm the source, then there may or may not be a pathway and there needs to be an impact on either human or animal health or whatever which is the receptor and if you don't get all three together then there is no problem. (HPA-MD-M10)

The HPA also has food, water and environmental laboratories, which are part of their Food, Water and Environmental (FW&E) Microbiology Network, and within them approach the environment through the lens of microbiological threats to human health (HPA-MD-M10). Here the environment is not so much the natural world but a construct assembled by people looking at the issue from various places within the public health sector and beyond, and who have specific roles and social responsibilities which frame their interaction with natural events. Also, the understanding of the importance of scale (where the microbe connects to a body in a larger environment) which is central to this approach does not get abstracted beyond the medical model. As a result, the technical and scientific knowledge is not translated into theoretical frameworks or organisational mandates which could lead the HPA to expand its notions of social and environmental drivers and ultimately feed this expert knowledge into the health prevention and health promotion activities it consults on.

References to the natural environment outside of the STAC hazards and response framework were less formal, institutionally driven and also focused. For all HPA respondents, the environment they spoke of was the social environment (also referred to as the socioeconomic or socio-cultural environment), and for the majority it was also the built environment. The natural environment was least often invoked and most variably defined. One medic *cum* public health consultant who did offer a definition of 'the environment' split it into three spheres:

There's the social environment like public perception ... [I] spend a huge amount of my time thinking and responding to perceptions of problems rather than the actual physical problems themselves. There's the built environment, which is commerce, industry, housing, there's also traffic and mobile things: trains, ships and things and they give us difficulties because tankers leak on the motorway and that kind of thing. So there's also chemical spillages and things that happen in industry—you get a fire in the factory and then a plume of nasty chemicals going over a community and there's the heritage from the commercial environment—that's the contaminated land issues and the landfills, radio masts, those kinds of things. Then there's the natural environment and that's air, land and water ... so things we can pollute, but also you get problems in flooding, heat waves and those kinds of things that all affect the health of the population. (HPA-PH-M02)

This individual is unique in his comprehensive description of the environment, which may be due in part to his extensive experience as a doctor in a developing world context or a more recent experience working on a case with environmental health colleagues where two people on a poor housing estate died from the same form of cancer, which was suspected (but never proven) to be environmentally driven. Whatever factors informed his decision to define the environment in this way, it is noteworthy that the social environment

(principally demands from the public) claims the majority of his time. Indeed, across all stakeholder groups, participants spoke about the power of the public, including the

Interview Excerpt

There was a little community of 2,400 and a lot of worried people ... we discovered the house was built on a landfill site. It was thought to have been built on clean ground. As that was investigated further we discovered that the bases of the houses were on gas pipes, so there was potential leak of gas into the houses. So we had to quantify the risks from the landfill to see if that caused the illness and ultimately the deaths? What we found was an explosive risk and it was asphyxiation so we ought to do something about the site now and of course we identified the stakeholders, by including the community. ... When we came to the end of the last meeting about a month ago now, we still didn't have answers as to why the [individuals] had died. We didn't actually ever think we would find that out and I kept saying that to people, that I'm not doing this to find out the causes, I'm doing this to understand whether it's safe to live in these houses ... while we haven't found out the cause of the deaths, we learned a lot more, which gives us confidence in saying, "it's safe here." And they could look at us and say, "Well, we don't actually agree with some of the things you're telling us, but we understand why you're telling us and we can live with that." (HPA-PH-M02)

impact of public opinion and perception on setting public health agendas. The built environment is mentioned by this stakeholder as the second issue that commands his time, with the natural environment receiving not only the shortest definition but also the least information about how it factors into his work. What counts as the natural environment, therefore, is primarily what can be polluted. The focus on air, water and food as the primary environmental health concerns reflect this definition, which can be sourced back to the frameworks developed within the environmental health discipline.

Stakeholders also tended to conceptualise the natural environment in segments. Descriptions offered, for example, acknowledged the social and the natural dimensions of the environment, and sometimes attributed importance to the natural environment as well, but seldom discussed the interactivity between the components. This was true even in interviews where respondents referred to the environment as a cross-cutting issue, with other stated cross-cutting issues being climate change and infectious disease emergences. In some cases a distinction made, and a debate that ensued in discussions organised around the binary, was whether health injuries were human or environment driven. One medic suggested, for example, that public health doesn't often think about the transmission of disease from humans to animals through the environment (HPA-MB-M19). These frameworks extend throughout other areas of work in the public health community as well, resulting in many initiatives which did not consider the constituent parts of environmental problems and their impacts on human health, let alone how responsibilities for these plans are to be carried out across the UK with its organisation of the public health sector into national, regional and local service providers.

Philosophically this kind of atomisation is linked to how humans imagine they are linked to the natural world, which has direct influences on health practices but more generally impacts how people approach living in the world:

I think there is this perception that if you are British, in fact it happens with North Americans as well ... nothing is going to bite me, all the water I am going to drink is going to be purely perfectly sanitised and I don't need to do anything about it ... So there's a perception that you are almost superhuman when you go to those countries because you come from a country where our healthcare

system is pretty good actually and you go to somewhere where there is no healthcare to speak of. (HPA-MB-M19)

While the HPA respondents expressed contrasting and sometimes contradictory descriptions about what the environment means to their work, together their interviews offer some insights into how the HPA as an organisation is evolving its relationship to environmental health concerns.

Research participants assembled as the UK PH stakeholder group do not share a common organisational framework. Rather, these are individuals who make links between the environment and public health in their work in universities, research centres, local health authorities and regional governments. Yet, there are some points of similarity in this group, such as the use of a three-pronged definition of the environment by many. One spatial planner in the UK PH group defined the environment as

a threefold thing, there are social factors like poverty which is critical, there are cultural facts and fashion and so on, how we behave which are quite deeply based in society but vary in different groups and certainly they vary hugely between countries. Then there's the physical environment and it seems that it's those three that really can make a difference. (UKPH-UP-M02)

Slightly different from the three-part definition given by the HPA stakeholder, in this case it was not the social, built and natural environment forming the triptych but the social, cultural and physical environment. This individual went on to explain, "some use the environment as a metaphor and the focus is not on the environment but on thinking about human spaces, about the social world in a certain interconnected way" (UKPH-UP-M02).

Disciplinary backgrounds clearly informed people's definitions of the environment and this variability was noticeable in interview with UK PH stakeholders. In the case of generalists, such as public health consultants, the environment was typically "anything outside of the hospital environment which may be communicable and potentially hazardous to health" (UKPH-SW-M06). This definition reflects an Environmental Health approach which focuses on practical issues, often those dealt with on a daily basis by

local health authorities, such as food hygiene. In contrast, for the microbiologist the primary environment is the human body, which in turn exists within other environments but the focus is on microscopic interactions of disease agents and processes within the body as well as across scales, such as instances of the interaction between an individual's immune systems (shaped by genetics and lifestyle) with/in the lived environment. Many in the UK PH group identified the environment as a place in which people live: it is "everything that is around us, or in sociological terms, it's kind of the context of our living" (UK PH, PH – LP). Some used the term material environment or lived environment as part of this discourse. The lived environment was as vast as the planet existing in outer space through to a built environment in which humans as biological beings live: "We are actually animals in [the material] world, we're made out to be these choosing things working on a rational basis but actually we're animals in the world" (UKPH-PH-M07).

Confusion about the natural environment being brought into public health discourses was a response by some in interview: "By environment do you mean climate? By environment do you mean housing, transport, that kind of thing?" (UKPH-SS-F03). Likely, this comment was made in an effort to discern what I was getting at during the interview; however, the participant's search for direction suggests that this may not be a subject frequently discussed by this individual. I encountered similar responses on several other occasions, including long descriptions about recycling programmes or a fragmented list of initiatives the HPA is involved in that happen to involve wild animals such as pigeons, rats or badgers. In another sense, asking whether I am referring to climate change, the built environment (housing) or environmental health issues popular in the media (air pollution and transportation) illustrates that what the environment is and what environmental health aspects public health should be addressing are as much about health as about interactions between social, political and economic forces, the management of public perception, and priority setting within the health sector. Finally, the high degree of subjectivity about what constituted a relevant natural environment within public health led participants to offer broad definitions of the environment. Those who offered a specific definition drew on

personal beliefs and experiences and not on formal policies or environmental public health mandates.

There is something challenging about placing public health within bio-ecological frameworks. One participant described roadblocks she encountered when trying to make the conceptual connection for colleagues:

I was on the Local Agenda 21 Steering Group for the city. And the same issues would come up working with people in the local authority or in the health authority who could only see environment in terms of what we might describe as a built environment or ... transport or ... waste management or pollution or something like that. There was no sense of it being about the whole of our lives, the lived context of our life (UKPH-PH-F04).

Based on participant responses, it seems that in Britain the environment is an active terrain of construction, contestation and negotiation within the public health sector.

As one participant stated:

I'd certainly like the public health professionals generally to see environmental health as their role, as something that they should be getting involved with, particularly sustainability issues. I do think they tend to get very involved. They have a big blinker and only see the things that are on their plate hitting them on a day to day basis, whereas a lot of the sustainability issues you've got to have a vision for it, you've got to look forward it twenty years, well more, you've got to think about the future ... there is a risk that if we ignore these bigger issues, they're going to just cause huge problems in the future. (HPA-MB-M15)

The international stakeholder group, comprised of individuals who are increasingly addressing the environmental dimensions of public health issues, offers a contrast to the UK stakeholders in that they were unanimous in their embrace of the environment as a highly relevant factor to public health. While this perspective is not representative of how public health sectors around the world are addressing the environment—although in many cases the issue is more central to the public health remit—the views offered by this stakeholder group offer an informative set of counter narratives to the UK perspectives. Terms used to describe the relationship between health and the environment by this group were more specialised, such as ecology, ecosystems and biodiversity—concepts that are the focus of the following chapter.

At this point, however, I would like to draw attention to two discourses emerging directly out of UK stakeholders' definitions of the environment, as they offer one way to investigate the data in more depth. Thus far, the focus has been on describing overall definitions of the natural environment and its relevance to public health. In the subsection that follows two specific themes that emerged in interview are considered: the environment as context and the environment as agent. Discourses of the environment as context described milieu relevant to public health while discourses of the environment as agent elaborated upon the notion of context by describing how these settings actively shape illness events.

Environment as context

A presiding characteristic of the discourse of the environment as milieu is that the environment was viewed as a backdrop against or a context within which illness events occurred. Within the HPA stakeholder group, when respondents conceptualised the environment many did so by thinking about it as the built, often urban, environment. The built environment was understood to be a health indicator because of its impacts on people's lifestyles, as is reflected in discourses

Interview Excerpt

So in terms of the natural environment and how that affects health and particularly infectious diseases it's a bit of a complicated story. The general notion is that we depend on diversity and stability which is I think generally true... even biological ecology as opposed from any other context of ecology is important, it is usually only in circumstances where things are changed where man is brought into contact with new vectors or reservoirs of infection and then you get the emergence of disease or different patterns of spread, and of course one of the things that we all worry about a lot is what will climate change do in terms of altering environments and at the moment it is not at clear. ... So for any of the diseases, there are theoretical links but the evidence of clear linkage between natural variation, natural influences, I mean such as climate change or other changes and health, it is a bit complicated and not always very clear, particularly in relation to climatic influences, but obviously there are certain times when man gets into closer contact with organisms or where we change local environments and hence we get altered circumstances, altered exposure patterns, or where we have intensified and taken shortcuts particularly in relation to agriculture, where new diseases have arisen and the classic case for that is the BSE. (UKPH-MD-M01)

around obesity and obesogenic environments. Natural settings were also imagined, as in the case of one medic describing an H1N1 outbreak in the UK: “it sort of goes back to the environment, these swans also frequented a [lake] in the centre of [X], a moderate sized town [with a] small lake literally in the centre of town with a shopping centre next to it” (HPA-CDC-M18). In this text, the lake and space around it is the environment and is identified as a possible site of emergence. In interview, the stakeholder describes the interactions between birds and humans that occur because of the lake (birds feeding and people walking) yet the lake continues to slip in discussion into being a backdrop, a place where a series of drivers in the transmission cycle of the disease are brought together rather than an agent in the transmission cycle. This framing occurs in other situations as well, such as in a discussion of forests in China and their role in new disease emergences:

We are now encroaching in other areas of the world where previously humans didn't exist ... southern China wasn't colonised because there was too much malaria, hepatitis and God knows what. We are moving towards these areas now and we are having to look for organisms which previously we didn't know about. So microbiology has to adapt the tests that are required because people are coming back from these parts of the world with the weird and wonderful, and it is not just the infectious diseases. The drugs that people are requiring to treat these are changing, the information that we are providing has to change too (HPA-CDC-M18).

In the above quotation the threat is produced by a disease infested inhospitable nature and the response to it is expected to be mounted by science, microbiology in this case, and the pharmaceutical industry, with the medical community as the intermediaries and the infected travellers as passive patients. The strategy proposed is to conduct and adapt tests to catch the weird and wonderful, to conduct surveillance so as to screen individuals coming into contact with this environment, and to modify drug based treatment regimes. The medic also suggests that the information the medical community is providing has to change. Usefully, this quote points to another set of issues and that is the public health threat posed by the element of the unknowability of an environment. Not only is the natural space itself potentially threatening—depending on the kinds of prevention protocols put in place (e.g., spraying)—but public health interventions often have to go ahead in a black box as the mechanisms of disease emergence (the interplay between biotic and abiotic factors of

an ecosystem and the actualities of how people and the environment interact in these wild spaces) are not known. Pharmaceuticals and other medical interventions can deal with the infected traveller who has returned to the UK but upstream prevention cannot be part of an overall medical strategy. While this may be reasonable in cases where the origin is in China, there are cases in the UK where the interactions between humans and environments and the activities occurring within the environment's ecosystems are not known and neither are the points of connection between pathogens, vectors, humans and the social activities that are bringing these agents together.

In the UK PH stakeholder group, one repeated notion was that humans are animals reliant on their habitats. The framing of the reliance depended upon the scale at which the respondent was thinking and working. Taking a meta-view of the environment, thinking about the earth as a gaseous ball of rock, saw humans as coevolving with the planet over millennia, resulting in environmental public health issues being linked to issues of human survival at a basic level. A macro-level view addressed the state of a nation's natural environment or regional environments, such as watersheds and air quality as the scale of analysis. A meso-scale view of the environment as habitat framed it as local environments such as built urban spaces, green spaces, and housing. A micro-scale took the human body as the first expression of an environment and a habitat for microbes (HPA-MB-M19). Whatever the scale, participants shared the basic viewpoint that the natural biological environment is habitat. How to bring the environment at these various scales into public health cosmologies was identified as a significant contemporary challenge.

Environment as agent

The HPA stakeholders did not often discuss precisely how the environment was understood to be an agent producing health outcomes, even when the notion of a changing environment (for example in the case of climate change) was linked to population health injuries such as those caused by heat waves and flooding. Given the

complexity, one strategy used was to ignore the environment. One example comes from a response to H5N1:

We had quite a few cases and three of them ended up in the ICU, it was quite a serious outbreak. The guy from the health and safety executive, all he kept saying was "Well it's in the environment, we're always this close to a scare. It's just that birds carry it and you know that's normal. Why are you looking for it? If you look for it you'll find it." ... You know I just couldn't accept that ... something in the environment had changed. Something about their work place has changed. What's happened? ... He just was not interested at all. He was like "oh, yeah it's always there." Yeah but don't you want to know why? If we could of had somebody that could have helped us more with the environmental cause... it was really about the environment this outbreak, there was something going on in the environment that we didn't really understand and we still don't know. (HPA-N-F01)

While the willingness to include the environment as a factor is one part of this equation and another is the knowledge to do so, yet another dimension is how the environment is operationalised within a public health response. In the example above the simplest way forward for the health and safety officer was to take the disease in the natural environment as a given and to focus on containing it. Treating the environment as a variable would require investigating a number of processes, relationships and interactions between the human and nonhuman that would then need to be addressed. It is easier to frame the environment as context and to attribute agency to a number of environmental factors, such as the context, the birds, stock animals, or wild feed but to not look at the interaction between them. Conceptualising the environment as encompassing all that is not human makes it unrealistic to study in an acute outbreak scenario. Even when the environment is acknowledged as an agent, how to define it, what aspects to bring to life in an analysis, and whose knowledge should be drawn upon to do so are not always questions being asked or answered in the UK. Internationally, however, there are many instances when such issues are being explicitly addressed within public health organisations.

In interviews with two senior scientists, one from the Public Health Association of Canada (PHAC) and the other from the CDC in Atlanta, USA, each stated that their agency was now headed by a veterinarian, reflecting that at the core of many public health issues is an awareness of the significance of interaction between humans, animals and their environments. This viewpoint contrasts with ones exemplified, for example, by that of a medic in the UK PH group who stated: “Well, we've already mentioned about direct transmission from the environment to humans of viruses so that's pretty, factual, scientific and straight-forward” (HPA-MB-M06). To put this statement in context, this individual

was discussing food and water borne pathogens as environmental concerns and explaining that this is already a well-rehearsed set of issues in public health. Indeed, the microbiological and environmental health framings of the environment work well together in instances where there is a complementary division of labour and exchange of expertise occurring between lab and field workers, for example. However, many newly emerging zoonotic infectious diseases are showing that novel interactions are occurring, serving as a precaution against becoming over reliant upon routinized testing and response protocols when responding to these novel events. These data also raise the question of the appropriate place for the precautionary principle in scenarios when human-environment interactions may be bringing novel agents into new configurations of interactions. If best practice does not include a search for

Interview Excerpt

So you know there's this physician hiking on a trail along a river and he sees a body floating face down, he drags this person out of the river, starts doing CPR, he's exhausted but just as that person begins to come around another body comes floating down and he rushes back into the river, pulls this person out, does CPR and saves the second person and he's really tired now, then the second physician walking up the trail and she's looking over just wondering what's going on over there and the first doctor says “oh you got to help me, I'm exhausted, these bodies, these people are floating up, there's another one, there's a third one” and he cries out for help and she looks and decides to just keep walking up the trail, and so the first doctor shouts out “hey where you going, I'm desperate for help here there are bodies floating down”, and of course her comment is “I'm going upstream to see who's pushing them in the river.” (Intl-MD-M12)

complex interactions, particularly between humans, animals and their environments, it might miss the key to the prevention intervention.

There are logistical, financial and scientific reasons why it may be that the environment can be acknowledged as an agent in a public health incident but then dismissed on the grounds that it is simply too complicated to pursue and that understanding the mechanisms driving an outbreak may not lead to an improved public health response, at least in the short-term:

Over the year you get differing viruses occurring at differing times which no one really understands. But there are consistent patterns. So for example if you take respiratory viruses, you will get certain viruses occurring in summer and then viruses occurring in winter, other ones seem to occur all the year round, some have a peak at Christmas ... it's probably to do with different atmospheric conditions that lead to the ability of a particular virus to spread and to get from person to person on a background of immunity... (HPA-MB-M06)

For this person, the environment was a large-scale agent generating patterned conditions precipitating specific and predictable viral activity.

Perceiving the environment as a force capable of impacting human health makes it a subject worth understanding and an agent requiring careful consideration. The implications of taking such an approach are many, including a revisiting of the capacity of the existing cadre of public health theories, methodologies and technologies to deal with an environment that is actively engaged in shaping health outcomes and innovation when new dimensions of this complexified notion of health determinants need to be addressed.

The Environment as Relevant to Health

How the environment becomes relevant to work in the public health sector was discussed by stakeholders as being influenced by the division of responsibility for the environment within the public health sector, mandates of individual organisations and people's job descriptions within agencies. One consultant explained: "The Health Protection Agency is set up specifically to look at protecting the population from

microbiological, chemical, and nuclear health, but we take on other things on as well” (HPA-PH-M02). The ‘other things’ are typically local or regional incidents which regional arms of the HPA are called on to help address. Requests for support occur primarily at a regional level because environmental health officers and issues are largely the responsibility of local authorities and of many other organisations working on specific aspects of the environment and health at the local level, such as noise, transport, and air quality, others explained. Acute outbreaks were the most often cited reason why the HPA tackled environmental issues, which has meant that recently in the UK, the HPA has principally worked on flooding, heat waves and infectious diseases: “other issues, such as hurricanes and typhoons do occur in the UK but they are small scale. Flooding happened and that is why the HPA is ahead on flooding” (HPA-CDC-M09).

Dealing with the environment has often proven a challenge, as the HPA has built expertise in the field of communicable diseases but not in the arena of the environment. Hard won status as well as professional ego for some meant that delving into the terrain of the environmental drivers of a health event was not necessary. For example, new information on the environment was not required because best practices for how to respond had already been developed. Another reason why conducting further research was not desirable was that environmental data often produces inconclusive results. A CCDC consultant working with a high prevalence of asthma in a deprived area described:

So I will say to [the community], well there is no point, because I can tell you now that if we do this study that it will show that you’ve got a high rate of asthma because it is a very deprived area. ... Landfill sites are another good example, there are loads of studies looking at the effects of landfill sites and it has taken years and cost thousands, but never ever prove anything ... they are always inconclusive. (HPA-HP-M01)

The expectation that the HPA is the organisation to address urgent and critical public health issues is also a factor shaping the approach the organisation is taking to the natural environment. This means that while there is a theoretical commitment to

studying the environment and working further upstream, it is not always possible to do so given the HPA's public health mandate:

The Agency is much more interested in the whole environmental bit even though the work we do is sort of 90 - 95% communicable diseases so it's an interesting switch really in our roles and we've had to learn new competencies and learn a bit more about dealing with chemical hazards, chemical incidents and water contamination things like that. (HPA-N-F01)

This quote makes three points that illustrate the contradictions and challenges at work within the HPA. The first is the message that the HPA is increasingly interested in environmental issues and this is being reflected in a shift in agency mandates. A second is that for a variety of reasons very little of HPA employee time is actually spent on environmental issues. A third, at least in this individual's experience, is that understanding and responding to health issues driven by the environment is requiring practitioners to stretch conceptually, medically and logistically as they develop new skill sets, expand their knowledge bases and challenge their comfort zones. It seems what people in the HPA are describing is that the degree of rhetorical attention paid to the environment is not translating into actual and significant shifts in the roles, responsibilities and activities of public health practitioners vis-à-vis the environment as a driver of public health issues, and yet an expectation that employees make such a shift presides. These observations raise several questions about what structures, institutions, and relations of power are producing the chasm that is opening up between organisational discourses of concern about the environment as a health driver, policy which suggests this is an important issue to address, and actual practice where there is simply not enough time or resources left over to do that work. At the same time, there are cases where HPA activity is addressing the natural environment in novel ways and together these issues raise questions about the role of individuals in changing the organisational approaches to the environment. The question also arises whether these trends are unique to the HPA or are also characteristic of what is occurring more generally within the national public health context?

One trend that seems to be appearing in the data is that those working in public health education, health promotion or more activist community based initiatives want to see a push towards a fuller engagement with the natural environment. Slightly more

cautious are those working in epidemiology, medicine and health modelling. While many in this second group were aware of the environment's relevance to public health, even to the degree that it is their area of teaching and research focus, they were also careful not to turn to natural environmental explanations without robust evidence of a direct correlation between a natural event and a health outcome. This rigour is in keeping with scientific and medical disciplinary commitments. What it leaves unaddressed, however, are those events and relationships where the data does not place an environmental issue within the category of extreme health risk or as no risk at all, leaving a high degree of uncertainty about what it actually means in relation to health. For example, when the data suggests there are indirect relationships at work and that non-humans will be impacted before the disease enters into a new cycle of iteration, or if the correlation between the environmental factor and human health injury only becomes significant over a long timeframe dataset, then a direct correlation in a short timeframe cannot be made. These kinds of 'grey area issues' are not easy to frame within the contemporary public health sector and are either falling through the cracks or are elements pertinent to other disciplines or organisations, and are being addressed without necessarily linking the findings back to health.

Debate about how much attention to the environment should be paid by public health agencies was another theme of the HPA interviews. The politics behind setting a focus on the environment were on many people's minds. One medic said:

The chief executive is very sympathetic to the view that the agency should be broadening its remit. The Department of Health wasn't always sympathetic to that; they wanted to be tighter on infections, chemical infections, chemicals and radiation. ...There certainly is a degree of tension about the scope of the agency's work. (HPA-RD-M04)

During the course of this research, the HPA appointed a new regional director who has published the HPA's latest vision statement. At the time of appointment, one of the questions circulating was how this new leadership would prioritise the environment:

We've got this vision statement that is being written ... [the authors] talk about needing to work together to deliver services commensurate with the changes in our environment ... Whether that's lip service or if that is indeed actually reflected in what actually we are going to instigate I don't know ... Strategic

documents are all very well, but it is actually what you do. I think they can probably identify lots of things to fulfil a strategic obligation in what we do now. (HPA-RD-M04)

When there is a lack of policy, or when the organisational mandates describe a general sense of the relevance of the environment but do not offer a more concrete action plan or a strategy for delegating responsibility to specific posts or committees, a high degree of subjectivity and variability in responses to the environment ensues.

Communicating about what the HPA is doing on the environment was, however, raised as important by someone in the Communications Department. Describing his efforts to make a specific link on the homepage to Environmental Health, this person thought that at this stage there is reasonable organisational agreement that we need a home for that sort of information, whether or not people would tend to go the HPA website for that kind of information:

I have highlighted that we need an area that is clearly marked, even if it is a few pages that simply link off ... so that they can put in 'environment' into a search and it will take you to a central location. That way then there is a link, whether it is to flooding, radon, or not something we have much information on—the impact of global warming—you can find it. (HPA-WC-M11)

In reading the interviews as a whole I can see that an uneven response from the different individuals and the public health institutions they represent resulted when it was left to the individual to decide on the (degree of) relevance of the environment to their work. The degree of subjectivity at work in these situations also raises questions about what factors might predispose a health practitioner to deem the environment relevant to their work. One element that influenced people's engagement with the environment was in fact not medical but personal: the confidence each held in their ability to apply their existing public health knowledge to issues with an environmental dimension, particularly as many did not have prior work experience or formal training in the area:

I am not too worried about taking phone calls [about environmental issues] whilst my nurses currently still go into a complete panic if they are asked about anything that is outside their immediate communicable disease remit. I promised them that I will organise some training for them so that they can learn the basics and then they would feel more confident out there and will kind of take on this new role. (HPA-MD-M10)

Clearly, whether through training in the classroom or mentorship in the field, the degree of familiarity an individual has to responding to environmental health issues affected how carefully the situation was addressed and to what extent the natural environment was considered within public health research and responses.

While the HPA respondents were pragmatically oriented when thinking about how the environment was relevant to their specific remits, the UK PH respondents as a whole tended to be more philosophical, even political, about the environment and its relevance to public health. As this group works on public health within services other than the HPA, there was a diversity of public health formats and frameworks through which people were engaging with population health. One public body of the UK government actively promoting the importance of the environment to health is the Natural England which is an executive non-departmental public body responsible to the Secretary of State for Environment, Food and Rural Affairs with the mandate “to protect and to improve England’s natural environment and encourage people to enjoy and get involved in their surroundings” (Natural England 2011). Natural England is working with partners including health care providers and NGOs to develop a Natural Health Service. A medic involved suggested that this health service is making the links between health and the environment in four areas:

One is getting more people out into the environment, and it starts from that little green patch in the city, all the way to the hills ... to use in their daily lives ... The second one is obesity, people who live near green space, everything kept equal, actually don’t put on weight quickly ... The third one is physical activity ... The fourth one is mental health ... as people who feel in contact with green space, they're actually less stressed and hormonal stress levels may be lowered ... We're looking upstream and saying look it’s not just the Department of Health that’s responsible for our section, it’s every single department in government. And so were pointing out the environment in your area ... The health services haven’t got that philosophy, that understanding, and the knowledge and by working with the Department of Health, they now have their new strategy of physical activity and the natural environment. (UKPH-MD-M03)

A cornerstone of Natural England’s work is to shift the orientation of the health sector away from a focus on illness and disease control and prevention to a focus on building

and sustaining health through a holistic sense of care for self and the environment. Another of the conceptual shifts being promoted was not only to see humans as part of the environment but also to see the environment as part of the human body. One of the observations made was that once practitioners started tackling public health issues through promoting healthier lifestyles, they found that they were having the side effect of people becoming more environmentally sustainable in their lifestyles. Initiatives that achieved this double win included tackling obesity through using green or blue gyms or eating more healthily, which meant decreasing meat and fat consumption and eating more whole foods. Each of these activities also decreased the individual's carbon footprint. A feel-good quality is part of the power of these strategies as is their double win outcome.

The Natural Health Service has some concerns, however, as they wonder if the localised successes of the programmes will be counted by the health sector and the government as health gains but will not lead to an overall long-term adoption of the basic philosophies of 'healthy people in healthy environments' as a basic tenant of the 'health service'. In addition, there is doubt that tackling some of the large environmental problems of our time (such as community wide sustainability projects) will ever become part of its mandate. Some argue that nothing short of a radical change, a paradigm shift even, is going to succeed in producing a health service that makes extensive enough links between health and environmental drivers to change the current course humans are on:

I don't know where the change is going to come from, because I certainly don't see it coming from within the broad public health movement anymore as what is happening now feels to me like reform not change. You know, all we're doing is kind of tidying up round the edges and, you know, bandaging the worst excesses and so [in my work] I'm not really making a difference. (UKPH-PH-F04)

Making conceptual leaps may require cultivating different ways of seeing, a reframing of ethics and values, and a refreshed take on what is critical to public health, both in the short as well as the long term. Participants gave many examples of situations that have made them stop and rethink the relationship between the environment and health. A social worker in Cumbria 'woke up' after the 2007 floods, as the incident is still impacting some local people's physical and mental health. Other people cited

newly emerging infectious diseases such as H1N1 and H5N1 in humans, blue tongue in sheep and increasing evidence that legionella disease is linked to climate change. Of these stakeholders, some argued that it is neither an individual awakening nor one person being appointed to work differently—although this will help—that will make a dent. Rather, a rethinking of what constitutes business as usual on a much larger scale is needed. Thinking about the place of the public health sector in fomenting a paradigm shift, a comment made was that the government should create a health not a disease service by spending more time looking upstream and making all governmental departments responsible for their part in generating and protecting the public's health.

Looking at the HPA from the perspective of the larger UK public health sector, one participant described that the inability of public health organisations such as the HPA to set their own priorities is a challenge. One example given was that the HPA must action governmental priorities, respond to political issues, and work within pre-existing systems where population health is not necessarily a priority. The Royal Commissioning Five Year Strategic Plans and other plans built around National Service Frameworks and Assessments are examples of how priorities are set for the public health sector which presently have the focus set on alcohol, tobacco, obesity, cancer, mental health and older people. For the environment to register as a priority area, therefore, it must make the priority list for processes like this five-year plan. As one participant said:

[The HPA] have it at their heart, I know that most public health professionals really have it at their heart—an understanding of the wider determinants of health, but the system forces them back into only dealing with the clinical elements of whatever it is that their job entails and they are kind of railroaded ... I always think it's a shame that there's a lot of aspiration within the public health field to ... go upstream but they don't. (UKPH-SS-F03)

Presently, environmental responses to health from within the public health sector tend to be more *ad hoc*, rising to priority status when qualifying as a critical incident, which is responded to through a crisis and containment protocol. There seems to be a great distance, therefore, between what is occurring and what needs to occur for the public health sector to contribute significantly to improving population health through long-

term shifts in social, medical and environmental practices. As one social scientist working in the arena of public health research stated:

Remember Einstein? He predicted that humanity could only survive for about 4 years if the bee ever became extinct. And we know the bee is in serious trouble right now. We have to start making those connections in public health. If we continue to focus mainly on reducing heart disease, stroke etc.—well, that stuff remains important of course but it's in no way enough. They're just symptoms of much deeper social ills, and public health needs to understand those ills better than it currently does. In the final analysis, the environment trumps all other arguments about health—it is overwhelmingly important for every species on the planet. (UKPH-SS-F06)

Moving out of the UK context, for the international group the relevance of the environment to their work was a given and was largely implicit in their interviews. In their responses there was little or no distance between their thoughts and practices and the environment and therefore no grappling with the relevance of the environment to health. Where tensions were identified, it was in the degree to which the organisations they work for, such as the WHO, UN, and the USA's CDC, would financially support making these links at an integrated, organisation-wide, and international scale. One reason for this may be that many stakeholders work at least partially in developing world contexts where poverty and other forms of inequality produce a variety of living and working conditions that bring people and environments directly into contact with one another. This contact can occur through small scale farming and the direct handling of livestock; the hunting, butchering and distribution of bush meat; the impacts of high levels of pollutants in the air or water; or, the devastation caused by extreme weather events such as floods or droughts which often leave populations sick and disenfranchised, temporarily or permanently, as environmental refugees.

In the developed world, it is exposure to natural disasters or environmentally driven infectious disease emergences which tend to bring the environment into focus. The CDC in Atlanta, Georgia, US, is one public health organisation that is increasingly engaging with environmental health drivers not only internationally but also domestically, working on events like Hurricane Katrina, the West Nile epidemic which began in New York in 2001, and at the time of interview a level 4 drought in Atlanta

that was producing water wars between Tennessee, Alabama, Mississippi and Georgia. State engineers, state and federal governments, stakeholders from the shellfish aquaculture industry and drought impacted citizens were all vying for rights to water. Issues like these concretise the environment as an issue for the public and as a result, one CDC employee stated, the government has pressure on it to act on these environment-health issues because they have caught the public's imagination (Intl-V-F03). Issues where the environment has been a key driver at this scale have not yet impacted the UK to such a degree, although flooding, droughts and some infectious diseases have required concerted attention for intense, albeit concentrated, periods of time; therefore for the most part, the environment remains a theoretical and potential future driver but does not presently garner as much attention as other population health issues, such as obesity or smoking.

Environment as a contested issue

Rejection, hesitancy, and dubiety about its relevance were three discourses used by those who contested the significance of the environment to public health. Within the HPA stakeholder group, there were some participants who stated that the natural environment was simply not a consideration in their work nor could they imagine why it would be: "I am not aware of anywhere there is a direct environmental component. We are, no I don't think there is actually and I am not aware of an HPA course at the moment which has an environmental component in it" (HPA-CDC-M18). As if to exemplify this point, one senior HPA manager began his response to my inquiry about the work the HPA does around the links between human health and the environment: "I can't think of an example, to be honest. What do you mean by environmental factors? Are you talking about water contamination?" (HPA-MB-M22). He did go on to offer examples of work others in the HPA are doing on water contamination and infectious diseases, but he did not consider the environment to be an important part of his public health remit nor his conceptual cosmology even though some of his own work has involved wild animals framed as a nuisance and a health threat. As a senior laboratory manager summarised: "I think it is fair to say that probably up until recently many people tended to dismiss [the environment], well not dismiss it but I don't think

we gave it a great deal of consideration. It was there, unless you were specifically working on environmental issues” (HPA-CDC-M18). Read together, these three quotations suggest that within the HPA the environment is often not directly related to official job descriptions and what is meant by the environment is not immediately evident, or at least agreed upon; therefore for a great number of people the environment is not on their radar unless they are working directly on the issue.

Rejecting the environment, not because it doesn't matter, but because the public can use it instrumentally in ways that do not assist public health work, was another way stakeholders approached the issue. Individuals using environmental explanations to avoid taking responsibility for their part in health problems were one example:

As a health professional is sometimes a bit depressing when the public blames an environmental factor whatever that is, you know a factory or a landfill. They are happy to blame the environment and say well this is what is causing my ill effect and there is nothing that I can do. They then take their anger out on the health authorities or they will go to the council. But when you say to them, well hang on a minute, if you stop smoking, lose weight, take more exercise, some of them clearly are happy to accept that, but a lot of them don't and they don't like things that they have to do something about; whereas the environmental stuff is easy to blame. (HPA-HP-M01)

Describing a scenario where a community, convinced that the environment was to blame for their public health issue, accused the HPA of eschewing its responsibility for ameliorating the situation when research evidence did not support the environmental hypothesis was another example given. These descriptions by HPA employees illustrate how the environment can be produced as a container concept used to hold an array of meanings that make it difficult to actually address the environment as a driver of public health. Scapegoating, moving the situation away from being a health issue and into the terrain of the social, psychological and the political was also discussed. In other words, when the environment becomes a term infused with multiple meanings, employed for myriad ends by the public within various social relations of power, it becomes something other than itself, it becomes a socio-psychopolitical construct that can be put to work to a variety of ends that have more to do with politics than health.

A related issue is the cynical use of ‘environmental’ concerns by industry, such as the creation of ‘environmental companies’:

There are many mergers of drug companies with agricultural companies in the States—they are now called Bioscience companies. So you have companies like Syngenta which was a pharmaceutical company that bought out a seed company and they’re now environmental. At one time, they were going to be joining BP, so the spread of these allegiances now between drugs and agriculture is broadening—it’ll make things difficult. (Intl-SS-M06)

Once again, the environment is serving as a container concept, which can mean different things depending on the context and the agendas of the relations of power within which they are produced. There is a multidirectional problematic occurring where the greening efforts of conservation and ecological organisations, which are trying to make environmental care a household term, are being usurped by economically motivated initiatives which play on these concepts but which empty them of meaning and goodwill. I detected an underlying alertness to green-washing in many of the interviews. Once again the issue of clarifying what the environment means rises to the fore.

The issues raised by participants from the UK public health stakeholder group were somewhat different. One discourse that emerged, particularly in interview with people working directly on the links between health and the environment, was of caution. These researchers, medics, educators and public health consultants perceived explicit links between health and the environment but were careful to not overstate the causality of the relationships with one of the challenges being that while the environment can be seen to be driving health injuries in other parts of the world this is not yet occurring in the UK. Citing climate change as an example, one medic described that there is some data correlating climate events and illness in the UK but the signals are still small therefore the data does not yet support a concerted response (UKPH-MD-M01). These factors only partially explain, however, why work on climate change in the HPA is still in its infancy:

We haven’t yet gone into the stage of identifying exactly what the environmental impacts would be of increasing global temperatures, although that is something that groups within the HPA are now beginning to look at ...

And the sort of things that have brought that to mind over the few years were the significant deaths due to the excess temperatures in France a few years ago. Hence the heat wave was done, but obviously flooding is also very high on the list. (HPA-CDC-M18)

Others, however, pointed to larger socio-political forces which may be playing a role in shaping the climate change and health agenda as there seems to be something occurring that is hard to describe but can be observed in particular settings:

Recently there was a situation when ... a problem with flooding ... and at the time what happened was the people at the Met office and the people on the news predicted a freak event, it was a one in every two hundred years event ... if that was the case why did we have something extremely similar to it occur just down the coast in the same time frame ... a day or so later, which caused our outbreak of E-coli and why did we have a very similar downpour of rain that almost flooded a village on the south coast that wasn't reported at the time ... one in two hundred year events? (UKPH-SW-M06)

The stakeholder's focus was not on what caused these flooding events but rather on raising questions about the denial of possible links between overall changes in weather patterns (which would point to climate change as a driver in the flooding incident) by the media, the Met office, and society.

Another member of this stakeholder group did, however, point directly to public opinion as a factor in contesting the links between health and the environment:

I think there's still a good number in the public that will not argue that climate change is a problem. They aren't convinced yet and until you've convinced the public there is a problem worth addressing I'm not sure they'll be happy that money that should be spent on hip replacements and coronary bypass grafts would be spent on new projects looking at sustainability. (UKPH-SW-M06)

This quotation makes overt an observation offered by many people in both UK stakeholder groups, which is that the public holds considerable sway in the processes determining the public health agenda. Having the power to make or contest the links between population health and the natural environment raises questions about who the public is, how public opinions and priorities are cohered into a unified position, how communication between the public and decision makers occurs, and what social and cultural systems are produced through these relations of power.

In turn, these questions open up other ones, such as what kinds of investments the public health sector makes in informing, if not shaping public opinion. If public opinion is crucial to the course public health takes, then these are issues requiring attention, particularly if one expectation of the public health sector is not simply to take on the role of responder to public health threats but also to lead initiatives that cultivate links between health and sustainability at the population level. If the comment of this stakeholder is correct, the current ethos in the public health sector is thus: “The environment is perceived to be not really necessary, it is perceived to be necessary only in terms of PR, management of public opinion” (HPA-EE-M13). Public doubt and public health sector disregard means that addressing the environment and complexifying existing approaches will more likely appear on future not present day public health agendas, once the urgency around making the links intensifies.

Putting the environment to work within Public Health

In interview, participants were asked about the formal organisational initiatives as well as personal undertakings (related to their work) they are involved in which link the natural environment to health. As the table below indicates, most stakeholders became involved with the environment as expert consulting on the public health implications of an environmental incident; therefore, many spoke about cross-agency collaborations as central to environmental public health undertakings. However, a closer reading of the data shows that it is often the same people who are engaged in both activities in an effort to augment formal initiatives with informal supports.

Modes of practitioner Involvement in projects on health and the environment x Sources Coded at each Node							
	Conceptual Linkages	Problems	Health Drivers	Involved as Expert	Cross Agency Collaboration	Personal Initiatives	Formal Projects
Environment	33	21	16	14	13	11	10

Figure 10. Ways stakeholders become involved in environment and health issues

HPA stakeholders spoke about the structure and the mandates of the different divisions of the HPA—which in and of itself is under regular change—as a key factor

determining how individuals worked on the environment. One respondent spoke about the format of the Environmental Public Health Service, which was the result of a merger of the HPAs Chemical Hazards and Poisons Division, and the ways this has informed a focus in the HPA on chemical incidents with other areas of concentration being infectious diseases and natural disasters. Not surprisingly, the examples of health-environment interactions addressed by research participants tended to fall into one of these key arenas. Chemicals and contaminated land was an often discussed example and in these cases, as one public health described it: “Environmental health is a cross cutter: obviously it involves chemical hazards, involves radiation hazards, whether natural or manmade, it involves obviously infectious disease hazards as well” (HPA-WC-M11). In the case of an incident, the health of the people affected falls under the jurisdiction of public health agencies like the HPA, but the land becomes the responsibility of another professional body, such as DEFRA, with the same division of labour occurring in other environmental health situations such as response to foodborne diseases. For example, one investigation quickly determined that the residential area where the cluster occurred was built on contaminated land, which then became a part of the investigation and required the involvement of other agencies because, as one medic said, “we don’t actually do the digging and stuff” (HPA-PH-M02).

Infectious diseases were also regularly cited as examples of environmental health work—not surprising since the HPA is framed as a communicable disease expert and is referred to as such by other organisations (HPA-R-M16). Describing the process of working through a health event, one person said:

We just recently had a cyclospora outbreak in a farm and that really did look at human health, the environment and animal health. We had people getting infections and we really had to look closely. We did a serology study and also did a questionnaire, marking what areas of the plant they work in and what did they do, did they wear masks, how close were they to dead birds and sort of connecting all the things together ... On a small scale you know it's just looking at everything. (HPA-N-F01)

Attention to these issues is also being paid at the organisation management level. A member of the Avian Influenza Group of the HPA described how it is trying to plan for

the next epidemic flu and in this case the link between birds and the environment becomes “a big worry” that “people are heavily looking at” (HPA-MB-M22). This individual went on to describe that HPA is involved in other things like Leptospirosis and rats in water, sewage contamination, and addressing viruses like Hepatitis A and Norovirus which are transmitted by water, which had been linked to several outbreaks the HPA had worked on:

A good example of Norovirus ... where there was a sewage contamination of the lake which caused a large outbreak of diarrhoea and vomiting, about 20 years ago now. Then we do get examples of shellfish contaminated with Norovirus as well as Hepatitis A. So we get involved in those kinds of issues. Also the studies on bathing waters and enteroviruses because enteroviruses can cause all things from rashes to meningitis, they're certainly in swimming pools and seawater. It's contaminated with human faeces and can cause a spread of those viruses, particularly in summer. (HPA-MB-M22)

The above are examples of ways the natural world becomes relevant to a public health response simply by following the disease pathway from the outbreak in humans back to the source of the contamination. The microbiological approaches to understanding diseases such as enteroviruses are instructive as they, as a matter of course, use the RNA virus to chart a pathway between the humans (or mammals) who are ill, the routes of transmission and therefore the kind of contact required for transmission, the role environmental factors play in

Interview Excerpt

Many individuals would love to work more on the environment but have no way to do it because of the burden of other commitments and the lack of an understanding within the system. So I have been trying to develop a system which includes things like regional environmental hazard groups which would look like each local health protection unit nominating a rep to lead on environmental things and in the same group we would also have a rep representing all the local authorities of that region. A member from the environment agency, from the NHS, public health department, department of health could meet together quarterly and update each other on what is going on, building a network within the institutions of people who can handle any topic you want to throw at them ranging from incidents and how you communicate and manage incidents all the way to chronic issues like waste and contaminated land or whatever ... A national set of structures like a network of environmental public health practitioners in the HPA is a good idea. (HPA-EE-M13)

facilitating transmission, and then the pathophysiology: how the mechanical, physical and biochemical functions of the body are altered and finally how the virus is shed back into the environment. Examples of this systems based approach not only at the microbiological level but also at the meso-level of the human vector in the environment were given in the case of possible links between climate change and mosquito borne illnesses such as Chikungunya (HPA-MB-M03) or Lyme disease. In the case of the HPA the descriptions of the links remained 'big picture' pointing to an acknowledgement of these kinds of interactions:

Lyme disease is spreading ... whether that is because the host species is spreading or whether that is just because there is greater human activity intruding into areas where previously there wasn't. Or whether it is now that the organism or the tick have adapted slightly and have migrated because of the temperatures, or because the tick has adapted or whether that is due to manmade pressures or environmental pressures, who knows. But we do have the potential for new diseases and for old diseases to come back, and so we are going to see a re-emergence. (HPA-CDC-M18)

Working in the context of the HPA, where the environment is not necessarily an organisational priority, has been a source of great frustration for others. They have sought to move things forward by spearheading various initiatives within existing frameworks and to enhance them through interventions which are not explicitly environmental, as this may invoke resistance and ultimately thwart movement. One *medic cum* epidemiologist shared how he is developing mechanisms to show management that "there is enough work in this area of chemical and environmental hazards to justify creating formal structures, such as meeting every three months or whatever, that would facilitate our work and make it less burdensome. So it has been accepted but the work is nearly always done by people who [of their own volition] have wanted to do it" (HPA-EE-M13).

In contrast, more UK PH stakeholders work on formal initiatives which link health and the environment than do their colleagues in the HPA. A flavour of the range of projects this research group were engaged in follows. Some were working at the scale of government, such as in their affiliation with Natural England's Natural Health Service, including sequestering EU funds for UK farmers to set aside fields to improve the environment and participating in the passage of Bills through parliament aimed at

improving access to coastal areas or another initiative to increase the percentage of greenspace per person in the UK (UKPH-MD-M03). Others were working on urban planning and health with a focus on building health in partnership with the Healthy Cities Initiative, including improving UK neighbourhoods “for health sustainability and vitality” through using city planning to promote physical activity (UKPH-UP-M02). Tackling cultural beliefs, one social scientists working in academe described that her main task is to conduct comprehensive reviews of how human health is damaged through societal factors and to raise awareness of these trends not only within academic discourses but also within the public sphere (UKPH-SS-F06). This participant is working in a team situated in a university and their plans are to write a book, publish discussion papers, continue to carry out qualitative fieldwork on the subject, communicate their work via a website and teach university courses—all focusing on the links between wellbeing, ‘modern culture’ and the environment. Addressing head on difficult subjects such as climate change, one respondent discussed that one of his commitments is to find ways to communicate simply about complex issues and to convey to people that:

We need to do as much as possible to prevent [global environmental change] in every second that we can. We don’t have the luxury of choosing sectors, and we don’t have the luxury of trying to aim for a specific numeric target. If we aim over eighty percent there are going to be no ill effects then we need to do as much as we can in absolutely every human activity there is. And that is both within the UK and globally. That’s the target, it’s as simple as that. But, climate change is not a single issue, it is a signal we need to ensure that we have environments and societies worth living in if we do get through the climate change disaster. (UKPH-EH-M04)

Reflections on the process of tackling complex issues, such as climate change or the links between health and the environment more generally, were also discussed in interview. One research participant talked about the impediments that disciplinary frameworks and professional gatekeeping play in advancing research:

My understanding is that professional filters actually encourage people to protect their territory at all cost and this inhibits them from making the kind of connections they need to and that’s in part why we are in this current crisis. I actually feel more positive about this than anything that has happened for a long, long time because people are having to make the connections between the environment, the lived environment and the economy, the social living

situations and in ways that we're definitely not encouraged to do. I'm hoping that this will really be a major paradigm shift. (UKPH-PH-F04)

In a similar vein, the links between social activity, the environment and health were also raised. For example, one epidemiologist spoke about the key role of human activity and technology in driving disease emergences:

The ability of viruses to move from place to place is also influenced by human activity. The classic case is viruses getting transmitted across the Atlantic in tires or in birds or a particular mosquito species, such as one in Italy which is susceptible to Chickengunia. Chickengunia or Dengue may now be brought back by a tourist to Italy. And before you know it, Italians have got Chickengunia. (HPA-MB-M06)

As one senior epidemiologist stated, while a resilient environment is desirable it is mainly the jurisdiction of other sectors that deal with such issues: "Clearly a non-threatened environment is important to have, but most of that I think has bearing in other sectors and those sectors deal with agriculture and fishing and energy and land use and those sorts of things" (UKPH-MD-M01). Once again, where responsibility for health and the environment lies in the UK is an active field of uncertainty and hopefully increasingly will become a vigorous field of debate.

Internationally, one of the areas where many people are working on health is in relation to 'global environmental change'; however, many were attending the conferences at which I was interviewing to learn and network, as this was a new area of responsibility. In part this is because the phase of articulating the issue as serious has involved lawyers, biological scientists, and climatologists and not health or social scientists. Once it became clear that health was going to be an effect of climate change the field of professionals involved has begun to expand (Intl-H-M13). Fostering collaboration, including building interdisciplinary conversations and projects, was a subject discussed by many in the international stakeholder group. For example, one person trying to link conservation and development organisations working on different aspects of an issue in the same geographical area pointed out that unless orchestrated their work may never intersect because of the distinct mandates of their organisations. He also noted that such approaches can begin with seemingly innocuous activities: "They do what they do, we do what we do and on occasion we go have a beer a glass of iced tea or whatever and compare notes" (Intl-SS-M06) and grow into a new culture

of working. For him personally, this approach also reflects an empowering decision he made in his professional career which focused on conducting impact assessments, which he found to be increasingly blunt tools for addressing the imminence of many human–environment issues:

I had done impact analysis for a long time and I was getting burnt out by it and it was increasingly frustrating in a lot of ways ... It is not trivial stuff but a lot of times you don't necessarily have enough money or enough time to do a really proper analysis and you are getting all kinds of pressure, certainly from the government agency that you are usually working on behalf of to get things done, in order to get it quickly and cheaply and in a lot of cases they will want to see certain types of results ... (Intl-SS-M06).

Now, focusing on environment and development organisations, he is doing something he feels will make a difference. One of his current preoccupations was the discrepancy in infrastructural resources between development organisations (which often own vehicles and other equipment, have offices and staff etc.) and a typically under-sourced environmental sector. In sum, his hope is “to make development a little bit lighter on the environment and at the same time to address some human welfare issues within [environmental projects]” (Intl-SS-M06). Others also spoke about a journey in their life that led them to become more interested in the environment.

Infectious diseases were a subject also addressed by many in the international research cohort, one of the observations made being that in some cases the diseases and their environmental drivers are similar in the developed and developing worlds: “They had a cryptosporidium outbreak here and the reason is because they are pumping too much untreated waste into the river and then they're pulling water out of the river ... It is not like we don't do that in the US as well” (Intl-SS-M06). This same research participant also cited examples of a different approach such as the case of the Adirondack watershed in New York:

It is really well documented and it cut the cost of their water treatment I think by more than half. They could have basically just treated everything or they could have just taken better input and treated it more and that is what they are doing, and I think that is way to go ... and yet you don't necessarily see that many other watersheds doing it. (Intl-SS-M06)

Of the stories told by the international stakeholder group one thing that stands out is that they are aware that many environmental health determinants have social drivers. For example, when bodies of fresh or salt water are polluted with human sewage, there are socio-economic and political forces enabling the contamination and therefore playing a role in contaminating food sources (shellfish) and aquatic recreational spaces (in some cases referred to as blue gyms). The involvement of the various governance and organisational structures under which each aspect of an environmental public health event falls can be multiple. In the case of marine shellfish contamination due to human sewage, for example, the organisations with jurisdiction over water and sewage quality, food quality, marine environment governance, the recreational use of natural spaces, and population health are all implicated. The biological reality of the coupled phenomenon of environmental public health issues brings various social structures together in novel ways. If and when these links are formally made, it will become clear that a multi-sectorial, multi-agency, multi-disciplinary response is necessary. How, where, when and why, and to what degree an environmental population health issue is produced as falling under the jurisdiction of the public health sector is certainly a complex process.

Reflecting on a question about what they would like to see happen in the future, one respondent stated, “the next big thing for me personally is making the links again between environmental protection and the health community” (UKPH-EH-M04). Yet, others looked at the future in a more tempered way:

Why should public health add yet another voice saying, you know, we need to protect our fisheries, look after land or do something or other ... Where there are identifiable and specific health connections then it is worth talking about and making it plain or trying to draw evidence or experience from elsewhere when similar changes are being thought about or planned. And there are plenty of examples where things have gone a bit wrong and clearly have effects on the environment, which is where things have collapsed and given rise to new health problems. (UKPH-MD-M01)

Translated into action this can be read as a debate about whether a full-scale health sector reform (which increasingly seems to be linked to more general social reform) is regarded as necessary or whether a more considered case-by-case analysis of the links

between the social, the environmental and health would suffice. Given the interplay between social forces and public health initiatives described by participants in this study, the presumption can be made that in time whether and how environmental issues should fit into the public health framework are issues that will be explicitly addressed because they will be actively shaping what is occurring in the social world.

Conclusion

The purpose of this chapter has been to describe how individual research participants engaged with the concept of the environment within their everyday public health activities. Across the three stakeholder groups, 'the environment' was the most often used term in discourses on the relationship between human health and the natural world. A matrix analysis of the data has shown, however, that those most likely to speak about this social-natural relationship were stakeholders at mid-career, working in academic research settings or in public health management positions, with doctoral level training (regardless of the discipline) and international work experience. The focus of this chapter has been on analysing in more detail what stakeholders are saying, thinking and doing when faced with the issue of how and whether the environment is relevant to population health practices.

This research shows that what is true in theory is also true in practice, namely that the term 'environment' can be used as a conceptual container in public health settings to produce a range of meanings. Overall, practitioners are aware of the linkages between humans and the natural world but what these linkages are, how they work, and why and when they are important to human health are not systematically addressed, as was illustrated in the subsections on 'environment as context' and 'environment as agent'. Yet, in many settings it is the ubiquity of the term which enables it to function as a conceptual container generalisable enough for stakeholders to find common ground. Thus, the environment can often serve as a conceptual point of departure—particularly at the interface between the research, policy, economics and governance. What is needed now is thoughtful shaping of how these cross-cutting issues are defined and which mechanisms are focused on as linking the various components of

the issue. Understandably, discussions about how to link health to the environment occurred in interview. In some cases, the relationship was contested. One factor which generated contestation was the vagueness of the terms of interconnection between humans and the environment, and another was the need for more evidence about how the environment impacts health. As was the case in the academic literature, a few stakeholders felt that this is a health issue that stands at the centre of the social world:

this is a cultural as well as a social/structural and economic issue. The threats go beyond health, although health impacts are obvious: flooding, starvation, heat death, mass migration, economic collapse. Public health is just beginning to get to grips with these issues—the Greens and Environmentalists have long understood them, but not necessarily the health implications. I want people to get the connections between our cultural beliefs and value system, our mental wellbeing and the implications for our environment, not just our physical health. (UKPH-SS-F06)

Reflecting on the data as a whole, and stepping away from issues of definition, relevance and contestation, it becomes clear that there are noteworthy differences in how each stakeholder group approached the concept of an interrelationship between human health and the natural world. While the three stakeholder groups are constructs themselves—in that they are comprised of a limited number of people, representing only small segments of the public health world, and their thoughts are frozen in a specific time and space—there are patterns in the levels of familiarity and engagement with the environment which can tell us how the environment is being taken up within the different sectors of the UK public health system. New questions arise out of this chapter as well, such as what are the reasons for the differences in frameworks, concerns and tools being used by individuals? What do these differences tell us about the role of education, experience, and career path in shaping the everyday practices of people working in the public health sector? How does the interaction between individuals in work roles and the public health organisations they work for structure their priorities and practices? The chapter that follows maintains a focus on individual thought and practice but moves from the general focus on the environment to a more specialised investigation of how ecological concepts are being used to delve more deeply into thinking and working on the links between the environment and health at the scale of populations.

Chapter Six

Constructing and Contesting Ecology in Public Health

The purpose of this chapter is to analyse what individual public health practitioners understood ecology to be, how they saw it as related to population health and what kind of work they put the ecological concepts to in their everyday public health practices. In this chapter I begin by introducing the concept of ecology as applied to public health. I then expand the analysis to look specifically at ecosystems and biodiversity. As in the previous chapter, the analysis is presented according to the three stakeholder groups. The analysis begins with an overview of stakeholder attention to ecological concepts, compared to discussions of the environment more generally.

Frequency with which Stakeholders Referred to the Four Concepts x Sources Coded at the Node				
	Environment	Ecology	Ecosystem	Biodiversity
Stakeholder Group = UK PH	18	11	8	1
Stakeholder Group = HPA	14	3	2	0
Stakeholder Group = Intl	12	11	13	13

Figure 11. Stakeholder's use of environmental and ecological terms

As the above table indicates, HPA practitioners cited the environment almost as many times as the UK PH group but did not address with any real significance notions of ecosystems (two references) or ecology (three references), and biodiversity received no mention. Considered alongside a qualitative analysis, these findings suggest that the HPA is primarily concerned with addressing environmental issues and at the time of the study those individuals had not yet paid concerted attention to ecological dynamics. The UK PH stakeholder group had slightly more interest (eighteen references) in the environment as a public health issue than the other groups; however, almost half of the participants in this sub-group also discussed the importance of ecology and ecosystems.

The actual use of the concept of ecology may be slightly inflated, because as in the journal literature, people used the term ecology not only in reference to natural ecological systems but also as a term for holistic thinking or as a metaphor leading people to talk about 'ecologies', such as social ecology or the ecology of the workplace. In contrast, the international stakeholder group used ecology exclusively as a biological concept.

Defining Ecology

Ecology was not a standalone concept used by the HPA stakeholders participating in this study, nor were formal notions of how ecology relates to their work. Of those interviewed, only one person explicitly mentioned the word ecology, first in reference to her experience of helping to manage a recent H5N1 outbreak in poultry and wild birds, stating if they had someone working on their team "with an understanding of ecology and the environment" (HPA-N-F01) they would have done a better job at managing the outbreak. Her second reference was to a basic view that the environment cannot be separated from health, particularly when dealing with infectious disease outbreaks. A few other participants did speak about the significance of interactions between animals, people and environments (referring both to natural environments such as lakes and built environments such as abattoirs) when discussing infectious disease outbreaks, which is in a sense an invocation of an ecological awareness.

Some individuals in this stakeholder group stood out, however, because of their work at the interface between human, animal and ecological interactions. One medic and public health consultant, for example, described in detail the frontline responding he does. One example he gave was work on H5N1 where he was asked not only to offer guidance from a public health perspective on how to think through the links between humans and wild birds, but also to advise on how to control human-bird interactions. In another example he described being an on-call consultant working a large fire that had, among other things, decimated a salmon river proximal to the incident. He was responsible for taking decisions relating to the toxicity of the fire and its management,

such as if it was acceptable to release the water used to control the fire into the river because of the dioxins released by the burning material. In yet another case he was asked to consult on increasing nitrate levels appearing in the boreholes where public water was being sourced and at another time on cryptosporidium levels that were spiking on a regular basis in that same public water source. He summarised his work, which touches on issues that could be identified as having ecological components, with the following reflection:

Whether that is environmental, species migration or adaptation ... we are doing it, I just don't think we would perceive it necessarily as doing that ... [So], I think I have a lot of experience but I don't necessarily have the opportunity to sit down and it put together in a sort of organised fashion, because in the HPA we are just doing so many different things you know. This week it is here, Thursday it is something else, then we have got exercises at X, ...[at which] we've got the media, the environmental agency, the health safety executive, RPD, the police, the fire, the ambulance, the national nuclear inspectorate, utilities I think even the military. And we do that on a regular basis, in one place or another. (HPA-CDC-M18)

Interview Excerpt

It is a quiet Wednesday evening you happen to be on call, the children have just gone to bed, you are just sitting down to read a book and think about what you have done during the day and the phone goes and it is a national person, saying 'oh there is a teleconference at nine o'clock because we have just received information that it is probably H5N1 in three birds'....

We go and do the examination of the individuals exposed, the lay of the land and I suppose from the environmental point of view there are large numbers of birds here and from a public health point of view, what interaction might they have had with human beings and what interactions might humans have with them, in the period between the birds being found and the results being achieved.

From the animal health point of view they are obviously looking to say well these birds are here, what are the sorts of birds that are coming here. Are these birds residents here, do the birds go off and that is where it starts impacting on the human health issues, because you know we've got potentially migratory birds there. Is this the migration time of year for these birds? Do these birds just come in for the evening to feed here, do they go off to other places during the day. Do other birds come from elsewhere during the day and mingle with these birds that might have H5N1 and so over a period of around four weeks we had altogether ten birds identified as having H5N1. (HPA-CDC-M18)

A more formal approach, which can be seen to have an ecological, systems based awareness, could be the Horizon Scanning methodology, for example, which has been used since July 2007 by the NHSBT/HPA Epidemiology Unit as a way to identify emerging infection threats that could impact blood donation safety in the UK. The reports generated a look at factors including the infectious disease/agent, country, and type of incident as well as making comments on how the transmission occurred. In interview a medic said:

We started doing what we call horizon scanning, looking through a combination of Internet, pro-meds, journals, looking for new potential threats. Again, we used the WHO criteria ... and kind of developed the methodology, it's terribly trendy now, everybody's doing it. But when we started this in 2002, there really wasn't very much going on in this area. ...Now of course the European Centre of Disease Control uses the methodology and suddenly it's much more legitimate ...We look at all the various press feeds, various news channels; the journals, what new infections have been reported. And looking also a lot at what has emerged over the past 20-25 years, and looking for patterns as to what could possibly show a lead as to what could happen now. I think we've always looked forward – but in fact, if you look back at what happened there with BSE and everything, there a whole load of lessons there that we've never acted on. I think that has influenced certainly an awful lot of what we do. But you have to remember, we are paid by the Department of Health, so we are primarily looking for threats to the UK population. (HPA-MD-F03)

The importance of collaboration between experts from human and animal health fields, such as work with veterinarians and animal neurologists, as well as between human, animal and environmental health agencies (for example between the HPA, veterinary laboratory agencies, the Food Standardization Agency, the Department of Health and DEFRA (HPA-MD-F03) was also identified as central to this strategy.

Ecology is not a concept in formal use by the HPA stakeholders I interviewed, yet, when an outbreak is identified as having environmental drivers, ecological dynamics can be variables considered within prevention and response activities. Consequently, the environment is thought of in ecological terms when an incident demands that HPA responders consider the relevance of human-natural interactions in their response. These situations are confounding in that there is a tendency in certain situations for particular individuals in the HPA to move toward ecological practices as a form of best

practice, such as in the cases of zoonotic disease emergences or Horizon Scanning; however, the concept of ecology is not recognised and therefore is not explicitly informing these activities. In sum, the mandate to protect, to advise and to support other agencies, as well as the methods of containment, control and prevention that drive public health interventions at the interface between health and the environment, mean that sometimes ecological considerations are essential to the public health response although at present it is an uneven, informal and case-by-case way. The unsystematic and incident driven approach means that success or failure of a response tends to ride on the expertise of the individual, as institutionalised knowledge of ecological principles and a mandated commitment to taking an ecological approach to environmental health issues are not embedded in the HPA's directives.

People in the UK PH stakeholder group, in contrast, did not often work on front-line public health emergency responses like their peers in the HPA. Rather, people were public health and health promotion educators working in university settings, public health researchers working in universities and specialised research centres, or public health practitioners concerned with environmental issues working in the public sector. Eleven spoke in interview about the concept of ecology but overall this was not a term in widespread use, nor was it given a standardised definition. In some instances, stakeholders used the term ecology interchangeably with biology, environment and sustainability, and many were unconcerned about mixing terms because to them all the words point to the significance of the natural world—an important topic to address in their view through whatever means possible. For others, the concept of ecology had a specific disciplinary definition, although this differed according to each individual. Some drew on a natural science definition of ecology in order to refer to the relationship of living organisms with each other and their environments while others used a definition that included both a reference to natural ecology or ecosystem ecology and social ecology, such as social landscape ecology.

Ecology as metaphor also came into play, for example when a spatial planner referenced the Chicago Ecologists of the 1920s and their observations of the fluid qualities of growth and atrophy in towns and cities, which were rapidly expanding in

the United States during that era, and the ways this group drew from ecology to develop a vocabulary to describe what they saw:

The ecosystem approach has deepened how you look at the relationship between human groups and activities in space ... and at the relationship between human activity and the natural world around them: water, air, land, soils, and so forth. And all of which are progressively affected by our actions. So there's a rich diet of ideas there to be drawn on and used. (UKPH-UP-M02)

Explaining, in part, why public health often uses the term ecology but seldom in reference to the natural world, an epidemiologist explained ecology has “absolutely nothing to do with organisms, creatures or the natural environment”; rather, it refers to local areas (such as the social environment) and is studied at the group level (UKPH-MD-M01). This epidemiological approach contrasts with the more philosophical and policy oriented one offered by people whose work brings ecological concepts into the arenas of public health theory, practice and policy. They shared that when they first began using the term widely in their work, they used it without duly learning the meaning of the (biological) concept. Although they have since studied intensively both the philosophy of ecology and social ecology, as well as natural ecology and public health, they continue to use ecology as a broad and even ambiguous term as it gives them a vocabulary (not available in the public health lexicon) to express a profound interdependence between humans and the earth. These two scholars also spoke of the tensions between natural ecology and human ecology and the importance of thinking about health as relationships of interdependence produced within these spheres.

As a counterpoint to those using the term, there were those who, rather than being silent on the subject, addressed their non-usage of the term. One person acknowledged that he only used the term because I had used it in a question. He did go on to say that the reason he doesn't use the term is that “people don't use it here.” He reflected that in the 1970s ecology was a term at the forefront of people's minds: “I don't know why it seems to have gone out of favour, maybe it's because people don't understand it. I suppose people do understand the concept of the environment maybe a lot more.” He also suggested that “ecology is probably now much more what we would call sustainability” (UKPH-SS-F07). An early career researcher stated: “ecology, that's not the kind of thing that ever crosses my mind to be honest” (UKPH-SW-M06).

There was also one public health researcher who was frustrated by the term and said that thinking ecologically can lead to navel gazing. He also remarked that the term serves as a buzz word which makes it an empty conceptual container or can lead to eco-waffle, such as in his experience working within government where the importance of ecological planning is espoused but actual evidence of the translation of expert consultation on ecology into action is lacking (UKPH-EH-M04).

All in all, ecology, and what it means to public health practitioners, appears to be highly variable, although in general it is used as a concept pointing to the dynamism of the environment. The individual's disciplinary background and areas of work largely influenced how ecology was linked to health. For those in frontline public health services in the UK, ecological principles could become relevant to a response and yet remain conceptually outside of the vocabulary of the response. When questioned, even these people suggested that ecological considerations seemed theoretical and not yet an issue frontline public health workers could take on given the significant demands they already juggle. It also bears mentioning that comments from the international stakeholders are noticeably absent from this analysis of ecology. As will become evident shortly, it is this group that has the most to say on more specialist approaches to ecology and health, particularly on the links between ecosystems and biodiversity and health.

Ecology as ecosystem

This section focuses on how the specific ecological concepts of ecosystems and biodiversity are areas where more specialist work on the links between health and the environment is being developed. As a note, HPA respondents are not represented here, because no one discussed the links between ecosystems or biodiversity and human health. In the UK PH stakeholder group only a few individuals were working directly on the links between ecosystems and health. In fact, only one person directly addressed what an ecosystem is pointing to the need to expand people's knowledge of ecology. A more nuanced understanding will be necessary as there are many translational issues that will then need to be addressed, such as how the concept of

habitats maps onto the public health concept of 'settings', particularly when used to rethink what health determinants are when working on the interaction between the natural and the social in the context of ecosystems. Speaking of his work developing a model for health that considered ecological principles one participant described:

Eventually the model that I devised was about nipping together the concept of health determinants on the one hand and the concept of ecosystems on the other hand. At the same time, I was really concerned about the way that knowledge is atomized or split down sector wise ... I really wanted to get a model that provided a space for each of these specialties, these sciences, but at the same time showed them in relation to other sciences. (UKPH-UP-M02)

Not wanting to stop at an ecologist's definition of an ecosystem but hoping to bring this disciplinary approach into conversation with others, he imagined lived spaces as human habitats within the wider ecosystem of the globe and highlighted that human health is dependent upon and affects the planet in myriad crucial ways. Given this interactivity the public health sector, in his view, should as a matter of urgency not only expand its contextual framing of health but also do so pragmatically. The public health sector should participate in the planning processes of social structures, systems, and buildings that manifest as built environments because the spaces and places constructed today are going to exist into the future and will, therefore, have significant contextual impacts on the production and prevention of health issues for a long time to come. On a more sober note, this stakeholder also described that in his experience the importance of ecosystems and ecological thinking is still not being fully absorbed by the general public or more specifically in public health practice.

In contrast, international stakeholders offered a variety of perspectives on ecosystems and health, ranging from thinking at the macro-scale of the international arena through to micro-level challenges of specific environment-disease interactions. Working in international organisations such as the UN or the WHO shaped their worldviews and led many to speak of the importance of working interdisciplinarily and across sectors and borders. For example, a physician and senior UN System Coordinator for a recently surging infectious disease pandemic stated, "when taken together animal health, ecosystems and human health have a set of interfaces that are key for us to start understanding and thinking about for the future health and security

of the human race” (Intl-MD-M11). A member of an international, interdisciplinary, non-governmental science programme also speaking about the relevance of ecosystems to international initiatives stated:

People are not only interested in the impact and the vulnerability of ecosystems, but also in the human drivers behind the degradation of land, depletion of fish stocks, and so on and so forth, and they are also interested of course in possible response strategies and it is our perception certainly it is my perception that there is a certain need for human dimensions research in the era of the Anthropocene. (Intl-H-M13)

Read together, these interviews indicate that on the international scale the interactions between humans and ecosystems and the outcomes of these interactions, whether global environmental change or health issues, are of import to organisational players in the global commons.

Given the newness of this arena, those seeking to embrace ecosystem thinking in their public health work face a series of challenges. Clarifying terms is a basic exercise that is needed in order to answer questions such as what is an ecosystem? At what scales is one working and how do relevant components interact? Whose health is being addressed? What is the definition of health in a specific ecosystem? The place and value of humans within ecosystems was another issue. For example, should humans be the focal point of a study, be defined as integral but not central to a system, as encroaching upon an ecosystem, or as dependent upon a system and its services? Those with microbiological or veterinary training or studying climate

Interview Excerpt

In the larger picture, we need to move away from this looking at humans, always as the cause of the disturbance. We are a source of disturbance on the ecosystem, but this can actually be a form of enriching or maintaining diverse ecosystems. A lot of the problems are related to policies and other kinds of incentives - they're trying to break the relationship between people and their food systems, people and their ecosystems, people and their health systems, so that in the larger sense we get transformed from actually participating in our environment and not just being producers and consumers ... So I think we really need to strengthen the relationship between people and the environments that nurture their health and their food, not compartmentalize the distance and even the barriers [so we can help] people understand their place within an ecosystem. (Intl-SS-M06)

change indicated that there are also questions that need to be raised about what aspects of an ecosystem are important to preserve. For example, some biologically trained stakeholders worked through the dilemma of whether the priority is to maintain specific species (a group of living organisms from the same taxonomic unit) or guilds (a group of organisms, not necessarily the same species, that use the same ecological resource in a similar way, i.e. a feeding guild) (see Merriam-Webster 2011). The crux of this issue is that species can die off and be replaced with others who perform the same function, if to maintain the guild as resilience in an ecosystem requires that the balance between producers, consumers and decomposers be maintained. These issues were defined as ethical, moral and pragmatic and some suggested that these too are public health concerns.

Not surprisingly, how to weight the biological and the social interests within an ecosystem was a concern for some. For example, is it possible to create a public health system where 'health for all' is in reference to human, animal and environmental health? In this moment, public health thinking requires a systems based approach which includes looking at the ecosystems services provided to human society (Intl-MD-M12). Ecosystem services are those services that an ecosystem provides, such as the provisioning of food, fibre and biomass used as fuel. Health outcomes are significantly affected by the kinds and qualities of ecosystem services generated both regionally and globally, as well as by the degree to which people are able to access and utilise the services. One ecological public health practitioner suggested that the concept of ecosystem services "is where the rubber hits the road ... so that we end up operating such that we maximize today's population's health but we preserve that same opportunity for future generations" (Intl-MD-M12). He described the conceptual shift that occurs when thinking this way:

What you realize is that when someone cuts a forest and they sell the wood the only thing that's being considered or valued is the wood for products ... you might very easily say that by not cutting that tree there's a lot more benefit, be it from carbon capture to habitat preservation to water... If we were to really think comprehensively, and this is where we're learning a lot from the ecologists and through the issue of ecosystem services, we're realizing that sometimes we can manage our resources in a much better way than we are presently. (Intl-MD-M12)

How to quantify and communicate the value of an ecosystem was an important challenge raised by some working in the area, in large part because of the emphasis on placing (neoclassical) economic values on the natural world and its components and systems and then making decisions using Keynesian economic calculations. Some found that the ecosystem services frameworks interpreted through environmental or ecological calculations can attribute health related values to components of natural systems as well as place economic values on ecosystem services (such as calculations of replacement costs of natural systems). Reframing the notion of 'value' using the language of economics was a useful tool when trying to offer alternatives to the 'business as usual' approaches taken by most governments, as well as by public and private for-profit organisations which have economic profit making—not health—as a bottom line priority. :

You can make the case for development on a big watershed which might degrade the water quality and kill 20,000 kids or you can say, well ... the main thing in the ecosystem services are the water services and you can go through this complex set of calculations to come up with things like [the water services] are worth \$500,000 and you are only going to get \$200,000 for the timber that we pull out of it. (Intl-SS-M06)

In interview, some also spoke about the issues that arise when trying to make a concept like ecosystem services work universally as a framework for influencing perceptions and practice. One parasitologist working in conservation health cautioned that sometimes ecosystems produce a disservice. For example, when a disease emerges, it does so out of an ecosystem, typically a degraded one. His take home message was that there is an added value to environmental protection and that is the maintenance of environmental resilience and homeostasis which stops diseases from emerging and protects human health (Intl-MB-M05). The health of an ecosystem, consequently, largely determines if that system will provide a health service or disservice. In other words, ecological health can be highly correlated with human health, particularly in indirect ways. This message, however, is more complex and harder to use as a tool of persuasion when issues of health and ecology are not priorities, as some stakeholders observed. It is definitely not a 'sound bite' the media would want. One of the many challenges for those working on health within the

framework of systems thinking which links the social and the ecological is to find ways to communicate the complexity of these issues as manageable, actionable ideas not only for policy makers and the general public but also for colleagues in the health sciences.

Not surprisingly, running through many interviews was a sense of frustration experienced by stakeholders who, despite the array of insights into the links between ecosystems and health, found that the public and those in the health service tended not to pay attention to these issues. A wildlife veterinarian described that in her experience those who already care about the environment are receptive to hearing about how ecosystems are affecting their health (Intl-V-F05) but that is tantamount to trying to convert the converted. The international organisation she works for was tackling this issue by working with social scientists and psychologists to identify what people care about in order to get “get people’s ear” and to figure out “do they really care if all these things are intertwined?” (Intl-V-F05). In another US based organisation, an environmental protection researcher described her organisation’s investment in basic research with the goal of gathering data that will help demonstrate linkages between ecosystems and health so as to advance knowledge, to open “people’s eyes about what really connects ecosystems to human health and wellbeing in a positive way” and to aid in decisions about how land

Interview Excerpt

We see a lot of instances where the wildlife health community is trying to involve public health. They’re campaigning for vaccinations, trying to let people know about the connection between tuberculosis in gorillas and tourism and are teaching visitors to wash their hands so that they’re not getting a strain of influenza virus. These are things we need public health to be more interested in ... You can’t do a multidisciplinary approach coming from one discipline trying to do other people’s work.

I think having experts wanting to weigh in, then working together and having the approach be trans-disciplinary and not having one program that each person checks off as being okay by their standards is important. It does have to be people sitting down at a table and working together so that there is actually one holistic approach. Each program can’t involve every sector or discipline, but if we start working in that direction then we can call on those colleagues who are already involved in this sort of universal approach that can blend in whenever it’s needed in that particular area. (Intl-V-F05)

is used and developed (in the USA) (Intl-EP-F04). These two researchers, although working in unrelated organisations, are also bringing information to the population health sector about how animal and environmental health is impacted by human activity and are trying to make visible cycles of interaction in ways that make sense to their public health colleagues. Working for environmental and wildlife organisations, their mandates are to protect the nonhuman world first and hope that by demonstrating the benefits to humans and human health that their projects will find greater support.

In somewhat of a contrast, the need to educate people on the value of healthy wildlife and healthy natural spaces was not described as a significant concern for public health practitioners; rather, their challenges were more centred around showing that (unhealthy) animals (both domestic and wild) and environments (both built and natural) can have deleterious impacts on human health. Their tactic was to inspire people (the public, the medical sector, policy makers etc.) to think about health in terms of interrelationships of causality and consequence and to include in the framework the presence and effects of non-human species and spaces, as is the case in zoonotic disease emergences. Speaking from a public health perspective, one researcher and medic argued that where ecology and public health come together is when “we try to really dig down and get to the root of the problems and not just treating issues superficially or reacting to them ... we’re trying to go upstream” (Intl-MD-M12). He illustrated his point with the case of malaria in the Amazon:

Look at the proximal, easily identifiable risk factors, like malaria carrying mosquitoes in the Amazon. You know that mosquitoes are dangerous right, well why are the mosquitoes there or is there something that’s shifting their abundance or activity in different places and then you realize ‘now wait a minute’, maybe the way the forest has been fragmented or some other sort of ecological mechanism that favours that dangerous mosquito [is occurring] and lo and behold if you want to get to the root of the health risk you [have to] go back to that environmental change and this is where it’s challenging but very exciting. (Intl-MD-M12)

A public health microbiologist and researcher in Canada gave a similar example, citing the links between ecosystem change and the West Nile epidemic, which is transmitted efficiently by the *Culex tarsalis* mosquito vector via amplifying hosts such as birds:

In times of drought we were actually sometimes seeing enhanced transmissions. But then you think about it, *Culex* will reproduce in certain areas. As the water in which they breed evaporates in certain areas, more organic material is in there. It's a better breeding spot for the larvae and at the same time if there's less water, more birds are going to come to those areas to get water and to be fed upon by the mosquitoes. So you can actually rationalise those kinds of ecological changes to enhance transmissions. We're still learning. (Intl-MB-M02)

Specifically taking ecosystem dynamics into consideration is an increasing focus of public health organisations in North America.

While a minority of stakeholders mused whether an embrace of veterinary and natural sciences meant that what was being practised was no longer 'public health,' others argued that in this moment in history only ecological public health can address current issues. Yet others offered a middle ground saying that until the anthropocentrism of the health sector is tempered many newly

Interview Excerpt

When avian influenza hit, we suddenly started getting questions that there were no answers to. We got questions from State Public Health Departments like, "Shall we close down the local park because the Canadian geese are in the park pooping and sitting in the water and should the kids not go in the water anymore?" "Shall we close down the local lake to fishing because the fish will no longer be fit to eat because wild birds have been wintering?" ... We had absolutely no way to answer those questions. So we put out money for funding for research and probably the world's best known wildlife avian influenza researcher responded and he's now studying infectivity of H5N1 or high pathogenic strains in water, persistence in water and things like how long will avian influenza last at room temperature, at 20 degrees, at zero degrees? Then he's looking at unsexy things like how long does avian influenza persist in faeces on the ground? Before this, he really never had a reason to study that because it wasn't of real interest to bird health. But because it's of interest to human health, this has now turned into a major effort and he's gonna be answering these questions for the first time.

...So these are the kinds of things that we call applied public health research. You won't see this kind of research being done at X because it isn't cutting edge new anti-virals or new vaccine kind of research. It's not fancy, its research to answer very practical questions that state epidemiologists and National Park Service people need to know in order to make some policy decisions. (Intl-V-F03)

emerging public health issues will not be addressed properly. One zoologist, for example, expressed concern about the continued anthropocentrism of social and medical approaches to health in ecosystems. He asserted the appropriate definition of an ecosystem is that it is a physical process, “a forward moving natural process” (Intl-Z-M08). Even in science, he thought, there is an element of ambiguity with the term ecosystem, so much so that some old scientists refuse to use the word, preferring expressions like diverse biological communities or assemblances. In his view, ecosystem is a general term, typically defined for lay people, particularly when the practice involves attributing human values to an ecosystem:

Its human blindness ... It's not scientific ... There is no human value in ecosystem services and goods ... It's just a human point of view ... If you say, 'okay if we disturb the ecosystem' ... from a ... physical point of view it's just modified, its changed; it's still an ecosystem. I mean, of course we value biodiversity, we value health. I accept that. But I am often afraid that people don't understand it's got a basic physical aspect. (Intl-Z-M08)

How to make the links between environmental protection (including species conservation) and human health was a specific issue raised by both the UK and international stakeholder groups, as were conceptual, ethical and methodological questions about how to work on health at the nexus between social and ecological worlds.

Ecology as biodiversity

Biodiversity was a topic discussed by a specific set of people, with the demographic profile identified in the previous chapter on environment holding true for those working on biodiversity and health. It was predominantly those in their mid-career, with postgraduate degrees working in managerial positions for government or research institutions, and with international work experience who tended to have the most to say on the subject. An additional demographic was that predominantly the International Stakeholder group with a biological or veterinary science background spoke to the issue—a finding which is slightly skewed, as many of the international stakeholders were interviewed at or through contacts made during conferences on biodiversity and health or ecological health. Nevertheless what the stakeholders have to share on the subject merits consideration.

In the UK PH stakeholder group there were those who stated that as a baseline biodiversity is important to health although high levels of complexity, interactivity and change are implicated:

I think there are some things you can say which are not disputed, one of which is that of course we depend on a biodiverse world overall. I think that is not in question, even if the disease mechanism side is more complex, it is clearly good for us to have a diverse world rather than one that is impoverished in some sense or other. (UKPH-MD-M01)

Factors making biodiversity a challenging issue to tackle were both ecological and social: “we often think that something which is biodiverse must be a good thing and it is sometimes more resilient” (UKPH-MD-M01); however, that cannot be automatically assumed. Using farming as an example, this participant described that much productive (farm) land used for food production is not biodiverse, not only in the case of industrialised agricultural landscapes but also natural habitats such as the Great Plains of North America where a few crop species have been extremely productive for over a century: “it cannot be automatically assumed that areas which are locally impoverished or at least reduced in their biodiversity are necessarily bad things. We are bound to require a mixture of areas I think some of which are more diverse and some less diverse” (UKPH-MD-M01). This medic’s observation raises questions about how to deal with issues of place, time, species and performance specificity when working on the links between biodiversity and health.

The tensions between human and ecological health were thematic when the environmental costs of improving the overall health and wellbeing of populations was discussed. For example, artificially-produced, high-intensity mono-cropping, which is a characteristic of modern agricultural practices, has led to gains in nutrition and produced the secondary benefits of establishing reliable, micronutrient rich food sources as well as food distribution systems (most often in the developed world). These practices have increased life expectancy in adults, decreased child mortality and improved the overall health and nutritional status of populations. They have, however, placed new burdens on public health sectors, particularly in post-industrial societies,

such as increased rates of morbidity and mortality due to agrochemical contamination, deforestation, obesity, carcinogenic food additives, increases in antibiotic resistance in livestock and humans, and the emergence of infectious diseases such as H1N1 and H5N1 (both of which emerged within agricultural contexts) and food borne diseases such as BSE. Perspectives shared in interview across the stakeholder groups indicated that there is not a consensus about which of the above issues, or aspects of the issues, constitute a public health concern and which fall beyond its remit because they are not only primary but also secondary health impacts. The international stakeholder group, as suggested at the beginning of this section on biodiversity, had the most to say on the subject.

The links between biodiversity and human health, however, are not actually new concerns to public health. One research associate and paediatrician from the United States noted that concerns about these linkages have existed in the international governance sphere for over twenty years, at least since 1992 when the United Nations Conference on Environment and Development highlighted these issues in the global governance sphere (Intl-MD-M03). Yet, and despite its existence as an enduring concern for some, one epidemiological epidemiologist at the WHO stated, “If biodiversity was dropped as an issue, no one would notice” (Intl-S-M04).

Indeed, for the majority of participants working on this subject, this was an area they were just learning about because it was increasingly evident that the health issues they were working on were impacted by issues of biodiversity. Others, in their work in fields such as ecology, environmental protection or wildlife veterinary services, had already been observing the importance of biodiversity to human health, as in the case of newly emerging infectious diseases. They were now hoping to make the links explicit to colleagues in the human health field in hopes that an integrated, cross-sector approach could use the priority given to human health to also help improve the health status of animals and natural environments:

I think that the wildlife community is reaching out to Public Health and EcoHealth because they see the effects on the animals and ... the effects those extinctions are having on our world as a whole and on human health ... We're starting to see some people reaching back, but it takes a bit of convincing to try and bring in that world. But I think it's because our population—wildlife—are

the ones feeling the most effects. And the people—they are in third world countries and some places where they're highly dependent on ecosystems. But in other areas and cities, where decisions are made, people are still much more removed. (Intl-V-F05)

Even when the issue of biodiversity was important, embracing biodiversity as a framework for discussing certain issues was not straightforward. For example, one Scandinavian zoologist working on rodent borne viruses stated that he would like there to be more consideration of what biodiversity actually is and what makes it valuable to human health: "The problem is it's a bit vague. People can mean very different things other than biodiversity [when using it] ... I would prefer people used the term community dynamics" (Intl-Z-M08). In interview, this scientist went on to explain that to him biodiversity is about community, relationships and ecosystem functioning. Therefore, strictly speaking, when working on health and biodiversity it is not the number of species that is the ultimate measure of biodiversity or the robustness of a system but rather it is a measure of guilds as they determine whether a food web

structure is stable or not, as was discussed in the section on ecosystems and health. To really appreciate what is happening, therefore, "you have to look at the whole community including the rodents and the predators and maybe parasites and pathogens" (Intl-Z-M08) and from there the task is to learn about the links between human and non-human species and their community dynamics.

Interview Excerpt

For West Nile, we can start to say that it looks like maybe less biodiversity in the temperate areas is a factor. That's where we're getting the epidemics much more in the temperate areas. Now, it's not as easy as just jumping to that conclusion. Maybe the temperate areas have other Flaviviruses, right? Maybe there is cross-protection and maybe that's why we're not having as big of a build-up. But part of it could well be, and I happen to be a strong believer of this, the greater biodiversity, the greater number of species and less good birds that are amplifying hosts. So we happen to have the bad luck in a place like Manitoba or Saskatchewan where we have lots of Cowbirds, lots of English sparrows, lots of robins, excellent amplifying host for the virus. A very competent mosquito vector and lesser biodiversity it's more of them to come in together. So these are some the things that we're learning about West Nile. (Intl-MB-M07)

Providing a rationale for why biodiversity is important is yet another challenge that emerges out of this complexity. One community that needs to be convinced is health providers, and one of the most compelling reasons to care about biodiversity is to protect human health:

I really believe that environmental sustainability for the sake of biodiversity and for having nice environments is great ... and I believe that there are many values in that but I'm going to be speaking selfishly from the point of view of the human species because my background is in medicine and public health. I'm going to say my focus is really on sustainable public health, how do we maximize our own health and preservation (Intl-MD-M12).

The general public also needed convincing, according to most respondents, and figuring out how to make it relevant to them was a subject of discussion:

If you said to most Americans if you weren't using an iPod you could conserve another 2,000 hectares of rainforest ... most people wouldn't listen to you. So I think the approach is to work on conservation but provide reasoning that appeals to human wellbeing ... the point being that if a dam is going to go in and it is going to have really dramatic impacts on the natural environment, you could point those out ... But if you say well there are also going to be all these human impacts as well, they really start to take notice, both internationally and to a certain extent nationally although we all know in a lot of countries people don't treat all their population as well as they should. (Intl-SS-M06)

Similar dilemmas were described for the UK, where the majority of people live in urban contexts, such as how to bring the wilderness into their imagination as well to facilitate greater interaction between people and the natural world.

Despite these challenges, those working in the field felt that attention to the natural world was generally on the rise (Intl-SS-M06). For example, some respondents felt there is a growing interest from government and the health sector in biodiversity or ecological health, in part because of a realisation that there are health problems that can't be fixed by pharmaceuticals (Intl-S-M10) or individualised behaviour modification alone. Whether or not people sought to conserve biodiversity for its own sake or to improve human wellbeing was another matter and those who understand this were satisfied with doing work that helped people out and at the same time conserved biodiversity without making a big deal about the double win of their work (Intl-V-M01).

Ethical issues were tightly bound to the topic of biodiversity and health. An overarching issue was the disappearance of species of plants and animals, including those of pharmaceutical import: “extinction rates right now are a thousand times higher than background rates, maybe bigger ... we are losing a couple of species a day” (Intl, PH – LG). In that there is still much to learn about the value of biodiversity, as studies of the medicinal, ecological, cultural and social studies in tropical rainforests have shown, the full implications of these losses is not understood.

The ethics of exploitation were also cited as a significant issue that would grow because as biodiversity is lost humans will have progressively less access to natural and genetic resources upon which both modern as well as traditional cultures still rely. One example given was the way in which biodiversity is being exploited for profit within the agricultural industry:

In terms of the agricultural community the large agrobusiness farms ... are very interested in biodiversity. But in terms of genetic resources; whereas the organic community is very interested in biodiversity in terms of yields, resistance to pests, sustainability, two very different aspects. (Intl-MD-M03)

The issue of biodiversity not only brought the public health community into direct engagement with issues of protection and survival of non-human species and their habitats but also raised questions about how humans are protecting their own survival by maintaining some of the

Interview Excerpt

Ethically if you want to be correct about things, when you lose a species you lose all of these endemic parasites as well, unless they've made the jump. And in fact if you follow the math, a species which is becoming more and more endangered is parasites. They are actually more endangered than other species because they are likely to run out of host, before the host goes extinct. There is going to be a point reached where there is too a small population for that parasite to survive. But, it's not something the public are really going to find a good use of tax based dollars - to preserve parasites. Ethically we talk about saving species and those are example of a species, probably the only species ever so far that we were purposefully trying to make extinct and almost did. To purposefully make a species extinct is a very dramatic thing to do. To do it by accident, by wilful neglect is one thing, but to do it on purpose and direct your efforts to doing that is a different thing. ... Destroying part of nature is not appropriate. These things are there and why should we have the right to make them extinct? (Intl-MB-M05)

important natural resources. This will not only safeguard human health, as in the case of medicine or food, but also in terms of the biosphere where biodiversity is essential to maintaining life support systems such as the recycling of essential elements such as carbon, oxygen and nitrogen. Despite how essential biodiversity is to human health, many described it as an abstract and complex issue which, along with its ethico-moral and philosophical aspects, made it a challenging issue to take up within a traditional public health framework.

Putting Ecology to Work Within Public Health

A matrix coding of how research participants addressed issues of ecology and public health in their work lives, in the context of formal projects or informal ones, shows that primarily activity focused around making conceptual links between the issues of health and ecology and dealing with the problematics that arise when working with ecological concepts. A third area of attention was efforts to understand health drivers when working within an ecological framework, as the table below illustrates:

How Public Health Workers Work with Ecological Principles in the Field x Times Sources Coded at a Node							
	Conceptual Linkages	Problems	Health Drivers	Involved as Expert	Personal Initiatives	Formal Projects	Cross Agency Collaborations
Ecology	16	11	6	7	5	4	4
Ecosystem	17	7	4	4	4	2	4
Biodiversity	10	5	6	2	4	3	2

Figure 12. Ways stakeholders become involved in ecology and health issues

As in the case of making the links between the environment and health, most research participants were involved as health experts brought in by other agencies to work on the health implications of ecological events. Slightly more people engaged in personal initiatives rather than formal projects suggesting that while cross-agency collaborations were relevant they were not as pertinent as they were for work on health and the environment. This table also shows that the container concept of

ecology receives more focus than the specialist notions of ecosystems and biodiversity—areas research participants tended to engage with once they had made the conceptual and methodological links between ecological principles and health injury event. Finally, conceptual or theoretical attention rather than concrete projects was the place where most activity on the subject was occurring, with many people still working on developing frameworks for how health and ecological events are interrelated. The issue of action and response was also addressed and in the context of the HPA, on the subject of ecology and health, many of the research participants described that the structure of the organisation means that Local and Regional Services (LARS) is where work in this area occurs. LARS helps the HPA provide regional services alongside the NHS, local authorities and emergency services through a network of regionally supported health protection units (HPUs) and laboratories. Each region has different relationships with external organisations such as DEFRA:

Because of the way the HPA is, [much of this is] worked out through LARS. Particularly in X region we have very very close relations with their DEFRA representation service you know the animal health folks. So I will phone them, when an emergency occurs and the first thing is that myself and animal health turn up with our suits and our boots and our hats in the backs of cars. (HPA-CDC-M18)

As this medic and frontline responder illustrates, it is through the formation of close working relationships between the HPA and organisations with expertise in ecology and non-human health, such as DEFRA, that ecological events and health outcomes are being linked. It is also, as this quotation intimates, an area that is being addressed because of the energy and commitment of specific individuals at the HPA who are leading others. They are also gaining expertise in these new public health response arenas by ‘jumping in the car’ and by always being incident ready, for example by having the appropriate protective equipment in the back of their car.

Ecological Public Health was being worked on by some of the participants in the UK PH stakeholder group. For one research team, ecology has been historically linked to public health and refers to human’s dependence on the ‘thin biomass that surrounds the surface of the earth’ (UKPH-EH-M04). This group approached their work by first identifying the earth as a system with limits and humans as challenging the outer

parameters of these limits. Centralising the notion of fundamental parameters within a public health framework by rooting their work in the material world, in the properties of organised systems (which they suggested could otherwise be referred to as 'society'), was intended to highlight the role conceptual frameworks play in human engagement with the life world.

Physiologically, their work stresses that humans are an animal species reliant on the natural environment and yet have brains which make them adaptable. In interview, in answer to my question about where the natural world figures into their theoretical approach they offered many comments, including this: "your question is an interesting question but it's still wrong. You were saying, 'But what about nature?' Actually you cannot separate nature from us, our expectations, our cognitions, how we live, our social relations. So even if you're focused on the trickiest aspects of nature, you end up having to have an ecological model" (UKPH-PH-M05).

Interview Excerpt

It depends a bit on what you really mean by ecological health, and how it is discussed. I don't think it is a common term, for most people in the health practice, it has arisen mostly because I think more from the direction of the ecological side rather than from the health side, and it has arisen because people are worried about the notion that we are intrinsically dependent upon the environments around us including the natural environment which is true. But I think it is a much more complicated story to know how that environment is important to health and the makeup and diversity of it is often dominated by the very small creatures who are the small ecology which are much more complex and it is not simply the absence of the large flora and fauna it is something a bit more complicated than that. How you relate that to health, well, I think there is still quite a lot or uncertainties about what the connections are except for those circumstances where you make particular changes and allow some new large organisms to invade an area or to come into contact with humans. (UKPH-MD-M01)

For others, taking an ecological approach was essential but for different reasons. One public health practitioner, for example, felt that making the links between the environment, sustainability and health, is "all about ecology" (UKPH-SS-F07), while a health promotion educator and researcher felt that population health issues can only really be addressed effectively if the lens used is holistic: "I think that public health can't be public health unless it's ecological" (UKPH-HP-F02). She went on to explain

that there is a heterogeneity of debates and dialogues occurring on the subject and a wide range of issues linking health and ecology in the global sphere and so, for her, ecological public health, ecological justice and social justice issues are interlinked and must be so within public health frameworks.

There were a few who were also thinking about the pragmatics of how to do this work. Taking for example the issue of climate change and the question of whether ecological drivers are impacting human health, one epidemiologist stated that surveillance is expensive and therefore putting in a new surveillance programme can only be justified when it is reasonably clear that there is a significant risk for people. He continued:

Particularly if you are going to undertake surveillance not just of human disease but perhaps potentially of the vectors because that means setting up traps and counting and analysing them. So the monitoring is kind of a complicated question too, from my perspective at the moment I think there is a case for doing it and monitoring of certain sites but I think it is more from a research perspective rather than from public protection on the whole, because purely climate change driven effects, you can't be too sure where they are going to occur; when they do occur it won't be so hard to find them I think. So trying to detect early on yes okay, but only, I suggest, when you have pretty good evidence that things really are likely to change. (UKPH-MD-M01)

The act of learning and capacity building was another theme discussed, particularly by those research participants (across all stakeholder groups) who were involved in frontline responses. For example, one microbiologist from the international stakeholder group reflected on intervention programmes he had been involved in for diseases such as Western Equine Encephalitis dating back to the 1980s and more recent work on West Nile Virus beginning in 2002. Thinking about the impact of chemical control programmes on health and the environment, he shared:

People see it could affect some ecology. I don't know that it really adversely affects an ecosystem. I know there are some debates about that way back in the early 1980's when they sprayed for Western Equine Encephalitis. They used to go out collect dead birds and test them. ... So there have been some assessments. I don't really know that it adversely affects it but it's a factor you have to consider. (Intl-MB-M02)

A veterinarian responsible for international wildlife veterinary projects spoke about the ways in which sectorial agendas can threaten effective public health responses by taking a narrow view of a situation and ultimately undermining containment efforts:

We try to engage the agricultural community because they know about how security is important, but it's becoming more so in understanding you can't just go shoot all birds all at once as some countries have started doing because you're actually going to spread the virus by doing that because you're dispersing the wildlife on the wetlands. So it's a whole different dynamic about the behaviour that is going to help the populations involved and the agricultural and human communities don't necessarily understand. (Intl-V-F05)

This same veterinarian also expressed frustration with the naiveté that can exist in the public health sector when working on disease emergences and pathogen transmission pathways between humans and animals:

It's amazing how much of the ground hasn't been covered yet. In a lot of situations they're assuming that some of the diseases that are popping up in the livestock that are affecting people are coming from the wildlife arena. They're not really out there doing the appropriate wildlife epidemiology studies, they're not trained and safely doing anaesthesia on wildlife and being able to do this sort of disease surveillance. Oftentimes, it's coming from the wildlife, sometimes it's not, it's going into the wildlife and maybe the wildlife then are spreading it around, like highly pathogenic human influenza – low path even the one that's been in wild birds for a long time, but it's harmless ... The problem is when certain strains get into a chicken, it can mutate with a chicken flu, and then it becomes a highly pathogenic human influenza, transmitted back into wildlife and then people worry about them vectors. But really, it was only because of that interaction, not just that this disease popped out of wildlife and is now killing us all. It's through that interaction ... and we need to educate people a little bit better about it. (Intl-V-F05)

The development of new conceptual models was also a subject some research participants spoke about, for example one veterinarian working at the CDC who said:

You've seen the picture where they show the three circles of wildlife, Ag [agriculture] and human health? You can label those circles anything you want. You could label those human health, ecological health and animal health, but where those three circles intersect is the area of research that I think is the most important to us. It's not in the outer part of any of those circles. (Intl-V-F03)

The approach identified above reflects that a growing awareness of the multiple facets of health issues is being used to develop public health research frameworks. International stakeholders spoke about their work with a variety of approaches making these links, such as Ecosystem Health, Ecological Health, EcoHealth, Medicine, Health for All (WHO), the Consortium for Conservation Medicine,

One World One Health (a framework emerging particularly out of the veterinary community) and the EcoBioSocial Model. All share points of conceptual as well as practical intersection if not overlap, many of which have been consciously fostered by those involved in building these movements.

Ecological health approaches were acknowledged by some as being a contemporary expression of earlier health movements which have paved the way for integrated, multifactorial thinking about illness. One important figure in leading global health responses to emerging pandemics stated:

It was the activism and the movement behind HIV that really opened up a lot of new exciting stuff in health care. And I believe that actually what we are beginning to see here is the beginnings of a movement. It's not quite the same movement as on HIV. It's a movement that brings together people interested in ecosystems, conservation, mixing eco-health, animal health via security, livestock and live ecosystems, and people interested in human health, particularly self-realization through health. (Intl-MD-M11)

EcoHealth brings together human, biotic health, and ecological health as a newly formed discipline that views all species and the scales of the molecular, individual, and community through to the regional and the global as connected through health issues (Intl-V-M01). As a researcher and educator in this newly emerging field stated:

Really, there are no boundaries of what type of health we're addressing. It's really a fluid system ... the other difference is that we are looking at the health impacts of the host population but also at the impacts of the host population to the vector or to the parasite. (Intl-V-M01)

He stated at the end of our interview that in his view the name Public Health is outdated and what he would like to see is that it is eventually called EcoHealth.

The EcoBioSocial Model (EBS) (an International Development Research Centre [IDRC] strategy) takes the view that the ecological, biological and the social dimensions of health can't be separated and therefore, that "there is always an EcoBioSocial dimension to a disease phenomenon" (Intl-MD-M09). One medic and researcher shared, however that "the title EcoBioSocial sometimes makes it difficult to work with people in the public health world as some people say that it is a bunch of tree hugging

hippies” (Intl-MD-M09). This indicates an underlying degree of hostility to the ‘greening’ of theory and methods within public health as well as highlighting the fact that formally looking at the multifactorial genesis of diseases as implicating human, animal and environmental issues in interaction is being ridiculed in some circles. In another interview, this hostility was touched on when a research participant said that the medical and health communities don’t have to perceive having a multiplicity of approaches as antagonistic (Intl-SS-M06). While critics may hasten to dismiss this approach, in the international arena this model is the approach used by the UNICEF/UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases (TDR) to work towards achieving the Millennium Development Goals by addressing neglected diseases, particularly as they are affecting developing countries and doing so in ways that can feed into policy change. The EBS Model is used not only to conduct research and inform policy but also to evaluate the evidence gathered by, and the efficacy of other integrationist projects that use the EcoHealth framework.

When asked about the differences between environmental and ecological approaches to public health, one medic, international educator and researcher in the field responded:

To me it’s really just one continuum, there’s not an either/or. I think that environmental public health acts on more or less these more proximate determinants of risk ... and I think that if they were to just continue that a little bit more and think about life cycle analysis, cradle to grave that would be good. So, let’s put scrubbers on smokestacks but let’s also ask why the smokestacks are operating. Let’s say they’re generating electricity, well they’re generating electricity because of electrical demand and so just by taking that next step you might say wait a second, a very good air pollution intervention is to reduce electrical demand. (Intl-MD-M12)

Environmental and ecological public health movements also have slightly dissimilar historical roots that are influenced by different disciplinary frameworks and therefore have been built upon specialised ways of operationalizing the environment and have used different kinds of tools to produce knowledge.

Conclusion

This chapter has discussed individual stakeholders' thoughts about, and experiences of, working on public health issues at the interface between social and ecological systems. When looking specifically at how stakeholder groups address notions of ecology (including ecosystems and biodiversity), the relevance of environmental and ecological drivers to population health and the role public health sectors and organisations are taking in addressing health issues intersect. In fact, a discourse that is repeated is the call for an ecological approach to public health because it is this kind of attention to complexity, interplay and interdependence that will enable public health to respond to the seriousness of the environmental drivers presently shaping illness events as well as health sector responses. I have been reading across disciplines and see that concepts similar to ecology and health have been given different names and orientations. However, looking at relative percentages of topical cover within the journal content and the interview data analyses does show some trends that bear mentioning.

In the search for a common vocabulary, it seems the only two concepts used in a significant way in both spheres are that of the environment as a 'cross-cutting' issue and the notion of 'best practice.' In both spheres, discussions of ecological models of health and ecological public health were undertaken with approximately the same frequency, suggesting that in my research population there are people working in this arena already (or moving towards it conceptually). A similar situation, although in relation to a term less often mentioned, pertains to the use of the notion of using 'an Environmental Health problem solving approach' when discussing directions to take to work on health at the environment-society nexus. This is, however, not a measure of overall referencing but one of congruency of fit between fields of theory and practice.

The greatest differences in discourses used within theory and practice arenas in this research were the discrepancy between the 26% of journal content which discussed governance frameworks in their work on linking health and the environment and the less than 3% of people who referenced governance frameworks in their interview.

Another contrast is around the concept of 'waking up' to the realities of the connection between human health and environmental wellbeing. This concept is not theoretical and therefore was not expected in journal manuscripts. The general notion of 'waking up' was only marginally taken up in the articles compared to the interviews: whereas 12% of material in the interviews discussed 'waking up' as a framework and only 2% of journal article material was dedicated to this idea. I have found scant referencing of policy and governance mandates in the field, which is interesting given the corresponding expectation of health in social movements and correspondingly the expectation that practitioners figure out how to work in this uncharted terrain. The growing importance of the environment to health in social movements and public discourses, an increasing pressure on the public health system to be seen to be acting as experts in the field, and the abundance of governance frameworks on health and the environment, particularly in the European Union, and to many of which the UK is a signatory, are available resources.

Similarly, some important issues in the field receive no attention in the theoretical arena. For example, 11% of content of interview data presented is taken up with discussions of interagency collaboration as a strategy for dealing with the challenges of working within public health on issues that link to the natural environment and often to animal health as well, versus the 0% of material taken up in the literature reviewed on the subject. A similar pattern was found in work on the intersections between human and animal health, which show that it was at 11%. In a similar ratio, the expanding jurisdiction of public health, often driven by environmental events where a public health assessment of the situation was required, was discussed in almost 10% of interviews. On one hand, concepts such as systems theory and holism were discussed within theory but not within the practitioner interviews, but in interviews the concept of uncertainty (although not always using this term) was discussed. In one sense, these discrepancies are not surprising, because a widely expressed lament by public health practitioners is the challenge of publishing their work in academic contexts in part because it is difficult to sequester writing time given the demands of their everyday work and also because there is a significant demarcation established with public health culture between what constitutes research and what is data gathered (according to

the guidelines of best practice) for a health incident response. It merits mentioning, however, that recent and future activity at the HPA to clarify its research and development strategies will hopefully add clarity to the aforementioned challenges. There is also an impoverishment in the literature on the 'cross-cutting' issue of health and the environment, not only because it is ideologically challenging to the sector but also because logistical challenges are formidable for a sector trying to shift how it 'thinks' and acts vis-à-vis health in this complex join.

Chapter Seven reads the analysis of environmental and ecological concepts through the lens of public health and looks specifically at the implications for public health approaches to the environment, given the ways in which the environment, ecology, ecosystems and biodiversity have been defined by individual practitioners within specific organisational contexts. In particular, consideration will be given to broader social, political and economic forces at work in relations of power that support and contest the extension of public health framework to include environmental and ecological theory and practice.

Chapter Seven

The Social, the Environmental and Public Health

This project started with the observation that the unit of survival is always organism and environment (Bateson 2000) and acknowledged that while a study of the social may already seem an ambitious task for social studies of health, increasingly human suffering on the planet is occurring in contexts of environmental degradation. Valuing the natural world by making it an important subject to address has therefore been central to this thesis. The project, then, has been to make the links between human social activity, environmental degradation and human health explicit and to investigate how they are being constructed and contested in the public health arena. The previous two chapters focused on how individual public health practitioners have constructed and contested the relevance of environmental (Chapter Five) and ecological (Chapter Six) phenomena to population health and have also identified moments which lead to changes in thinking and practice within public health.

In this penultimate chapter the focus is placed on the social structures—the artefacts of social phenomena, which become patterned social arrangements—in these construction processes. The view that through dialectical relationship society and individuals iteratively create one another (Berger and Luckmann 1991) influences my analysis as I look for these patterns within socioeconomic structures, social institutions, social networks, norms, rules and regulations. To the analysis of the co-production of the social world through the agency-structure dialectic I also bring a systems based interest in the multidirectional and multidimensional production of ideas about health vis-à-vis the natural world.

The Social-Natural Environmental Interface is Complex

A refrain throughout this thesis, particularly evident in the discourse analyses of journal content and in the interview data, is that the connections between human biology and planetary systems are complex, as are the myriad ways that the social structures human-earth interrelationships.

Reflecting this, in my data there were 108 different sub-themes (child nodes) where research participants raised issues that they deemed to be complex and therefore requiring at least some rethinking if not a new kind of approach. The graph below titled 'complexity' shows the top nine areas where the intricacies of the issues were raised as highly relevant to health responses with the values representing the number of passages coded at each theme:

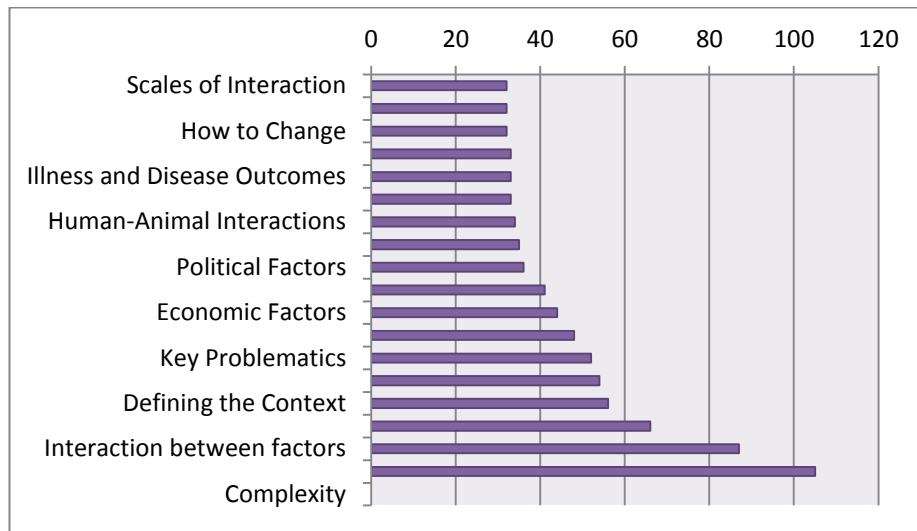


Figure 13. Issues of complexity identified by research stakeholders

As is illustrated above, one group of issues cohere around the social determinants of health (for example, political and economic factors). Another grouping adheres to the challenges of allocating responsibility for addressing environmental health issues (for example, identifying the key problematics in concrete terms or finding ways to describe the interaction between factors, for example when human and animal interactions are involved). A different cluster also forms around preventative thinking and, therefore, upstream ways of approaching illness and disease outcomes (for example, how to change interactions along the disease pathway to ameliorate if not prevent the problems).

In their text *Chaos, Complexity and Sociology*, Eve, Horsfall and Lee (1997) suggest that complexity reflects a new kind of science. Those refreshed by this innovative set of intellectual tools propose they can be used well or badly

but they are free of many of the limitations of our traditional armoury. With them we can dissolve old procrustean oppositions—between the ordered and the random, for instance—and in the process reinstate useful old ideas such as freedom. New concepts, new emergence, become thinkable, and new methods ... legitimate modes of study. (Turner 1997, p. xii)

Complexity draws attention to the importance of the relationships between components and between levels of component relationships and is useful because it is a way of studying even the most seemingly chaotic circumstances: “Complex systems can best be described as a self-organizing series of nonlinear differentiating processes wherein variation within one level of complexity iteratively produces variations in other levels over time” (Freese in Lee, 1997, p. 22). So, what does this all have to do with the study of health at the nexus between the social and the environmental?

Interactions, interrelatedness, interdependence and change are key concepts within complexity theory and to social studies of health offer an alternative to the deterministic, binary of modern social theory and many traditional biomedical frameworks. However, complexity theory also sets parameters and so is useful only in instances where the components of a health phenomenon interact, when there are still possibilities for new configurations of the relationships between components (such as social and environmental health determinants) and when the interaction between the internal components and the external forces changes over time—even if it is a

Interview Excerpt

Presumably, it's an interaction thing. If you look at how various diseases have emerged, it's a whole state of chance incidents. HIV, which is the emerging infection with the biggest impact in the last century, to see how that emerged and track how it spread through population movements and the effect of war and displacement. As long as everyone lived in a small village community and didn't go outside that village, then these communicable diseases, as they emerged, sort of died out. But they didn't. Everything changed. The movement was much more.

Just seeing how that spread, how that emerged, and how you got the virus lineages ... That is exciting and amazing.

It just seems that that happened from one or two interspecies transmissions. It just so happened in the 50's or whenever. There was one transmission between the chimpanzee and man and that was it. And the impact we've had since then. That's interesting. (HPA-MD-F03)

long range view of time (Lee 1997, p. 20). In health studies complexity theory has been used to study why the slow move towards preventative practice within health systems by looking at the “patterns of relationships and interactions among the system’s agents” (Anderson et al 2007, p. 669). The authors suggest that health care organisations are complex adaptive systems (not mechanistic systems) in which “relationships are critical, generally nonlinear, and lead to unpredictable dynamics” (Anderson et al., 2007, p. 669) and so attention needs to be paid to all the components of the system ranging from discourses to actors, people to protocols and ideologies to formal governance arrangements.

A place to enter into an analysis of social structures is to return again to the experiences of research stakeholders, as they speak specifically about their perception of the interaction between social factors and health outcomes, and in particular how they approach the complexity of the issues. One discourse in interviews that called for rethinking the definitions of context, and of the systems that link the social and the environmental through health, mirrored much of the literature already discussed. Using obesity as an example, one research participant (also an author cited in the content analysis) suggested:

Take obesity for example—it’s partly that we’re obesogenic organisms now living in an obesogenic environment for the first time in history. We have money and choice, so we indulge ourselves in things we’re genetically programmed to like—fat, sugar, salt. That’s a sound public health understanding. But it’s also that the industrialisation of food production is resulting in useless by-products of that industrial process—such as corn syrup—being snuck into most processed foods. It’s also that soya production is resulting in the deforestation of the Amazon basin—and we’re conned into thinking it a healthy product whereas it’s not. It’s also that we believe we have the right to expect strawberries in our shops at Christmas, regardless of the food miles involved and the carbon impact etc. Those are just a few examples, which take us a bit beyond public health but demonstrate interconnections between human health, globalised industrial processes, and environmental damage. (UKPH-SS-F06)

Traditionally obesogenic relationships in the context of public health have been analysed within health promotion frameworks and at the scale of the individual. Elaborations have been conducted in studies of context where the structure of the

built environment is now seen to influence food and exercise behaviours. In linking studies, the notions of green and blue gyms and 'double wins' are areas of work where looking after the environment is also seen to protect human health, as is exemplified through the work of the Natural Health Service. The more ecologically-oriented, connectionist approach described above, however, takes the work upstream as well to look at areas of 'cause' which are also the sites where prevention work needs to be conducted. The comments on obesity exemplify the way that likeminded research participants—ones who subscribe to the importance of such a framing of health—were rethinking health determinants, elaborating on the health settings and re-evaluating what aspects of the natural environments are relevant to their work.

Thinking about health at the nexus between the social and the environmental raises new questions, not only about the scale of analysis or the pathways through which health is actually determined but also about what is relevant. What seemed important at first, when thinking more systematically, led some participants to encounter another set of 'importances' which at first seemed at best tangentially related. Folding, unfolding and folding again ideas about practice (Deleuze and Guattari 1987) became part of the public health response. While some people spoke about this directly, many showed that they were engaging in such a process whether or not they ascribed theoretical importance to it. Those comfortable with the notion of interconnection of the natural environment to human health experienced the most ease in making movements that fell outside of the traditional thresholds of what constitutes public health. A hallmark of this ease was a tolerance of and patience for what could appear to be redundant lines of inquiry. One thing that enabled research participants to move into the unknown was their commitment to 'best practice', which they interpreted as fact finding until the cause of the event was clearly understood and a response could be orchestrated.

An issue that arises from this (as discussed earlier) is that, at some point, the lines between research and response become blurred. Some explained that their responses to issues were in-depth enough to have been considered research, which within the public health framework would have required a totally different approach in terms of

ethics, data gathering and the allocation of resources for the investigation. The artificial divide (and efforts within public health to identify just where the line between research and response should be drawn) is proving a significant impediment to working with the complexity that is often an environmental health phenomenon. A member of the international stakeholder group who leads a global food programme reflected:

I think because we paid attention to [avian influenza] in its early stages, it's now possible to realize that the source of that [emergence] is not a lack of vaccines or medicines, but the source of that is the production system. The rapid expansion of poultry production in Asia to meet the cultural demand for meat that wasn't present there previously is part of the emergence and then a production system that is very good in the industrial production of chickens but is a horrifying system. The people that work in there, they're exposed to a horrifying system of treating animals. So that's really the source: by growing our food and growing our livestock in horrifying ways, it's not just an agricultural issue, it's not an economic issue, it's become a health issue, even a cultural issue. (Intl-SS-M06)

Of course, avian influenza (H5N1) could have emerged at another time and in a place where humans and animals co-exist in more harmony, therefore industrialised agricultural farming practices are not the only sites of emergence of new zoonotic diseases. Interesting are the assemblages of factors gathered together in discourses to describe what issues are important to the emergence. How connections are made and what enters into formal discourses was a theme in other interviews and I found that many were connecting issues in ways that transcended traditional disciplinary thinking. For example, a zoologist from Eastern Europe who witnessed countries transition to post-communist states saw how these political shifts were impacting the dynamics of disease emergences occurring in the forests he has studied for several decades:

When the Eastern Bloc crashed the landscape changed a lot in many areas ... a lot of the former agricultural land was deforested, or just left fallow ... and when this Communist system crashed the behaviour of the people changed a lot. In Russia the Hanta virus disease increased quite a lot after the crash of the Soviet Union because fewer people were living in dense villages where they were controlled easily [by central government]. After the decline of the Soviet Union people were liberated. They started to build their houses or their cottages in the forest so they came into more contact with the forest.

It's very important to understand that ... political systems and change in political systems can really have drastic impacts [on disease patterns]. Like the Tick-borne encephalitis in Austria, or in the Baltic countries it has also increased since the fall of the Soviet Union and most people have said of course 'its climate change' ... But, they have also made very detailed studies in Baltic countries and it's very clear that it's not climate change, it's changes within the human political system that are driving many of the disease emergences. (Intl-Z-M08)

The interdependency of actions with other actions highlighted in complexity theory is reflected in the perspectives shared by these two scholars, as is their departure from traditional public health theory when in search of a way to explain the intricate interplay between social and natural environmental factors and health outcomes.

A richer sense of the relationships between components was also reflected in interviews where stakeholders contemplated on how a new sense of the complexity of health and the natural environment will impact their work. Stakeholders reflected on this issue in relation to various mandates of the public health sector including the requirement to develop, manage and communicate knowledge internally within the public health sector (for example in the immediacy of event management situations) and externally either with the public (in the case of longer-term health promotion activities) or through knowledge management that interfaces with policy formation processes and governance issues (when public health policies are formally regulated). However, it was predominantly the challenges of communicating with the public that were ruminated over. One discourse refrain was the ignorance of the public. In conference one person shared, for example:

The idea seems stupid to a lot of people; they're not used to it, it's the way the human brain works, they deal with the familiar. You just keep on talking about [the environment] until they're completely bored, and people start to move from this sort of disregard, annoyance, boredom, to accept it. So [eventually] they think my God why didn't we do this ages ago? (UKPH-EH-M04)

This discourse reflects the use of evolutionary psychology discussed in the journal analysis and points to many places in the interview data where stakeholders ruminate over how to make sense of changes in the natural environment and their connection to human health injuries, and just how to read these activities within the public health context.

Here a dualistic construction of the public health sector and the public comes into play and stalls the change process. The rhetoric is that the public health sector must pause as the new information about the interconnection between health and the environment percolates in the public sphere and the public becomes receptive to an agenda of change. Yet, this is only part of the picture about what produces roadblocks. A more robust approach to thinking about 'the public' in relation to public health may help identify where movement is actually stalling out. For example, asking who is 'the public' and how does a slippage in thinking about the relationship between individuals and the group in terms of in health research (such as the ecological fallacy) as in social research (such as ascertaining roles, responsibilities and capacities for making change) impact progress?

Remembering the example of the spread of hanta virus in Russia being popularly-linked to climate change but in fact being more closely associated with political systems, it is useful to question whether the focus on the public as the problem performs a similar function and dilutes or even makes invisible the role of social structures, political agendas, and social economic drivers in impeding health studies at the nexus between the environmental and the social. The journal and governance literature in fact shows trends and movements where the public has led public health policy and practice in areas of environmental health. An example is the role lay epidemiologists are playing in linking degraded environments to 'unexplained' health injuries by gathering data over time from their own lives and, when the data are convincing enough, working with experts to formally launch investigations (Brown and Zavestoski 2004). Additionally, in the governance literature, it was social groups and social movements that were attributed with cultivating the environmental health movement in the UK during the 1980s in the UK. When government was not interested, citizen groups found ways to connect with EU processes and together they brought the issues back to the governance table in the UK. Hence, in some instances working with the public involved educating community and in some ways this is occurring again as the public demands to know the population health implications of environmental dynamics in their communities, such as bird die-offs or natural disaster after effects.

The issue of having to wait for an ignorant or apathetic public to pause to digest new information before it can move forward may also be true for the health sector as well. One disquieting trend revealed in this thesis is that climate change is not a widely discussed issue and this is true for each of the data sets (governance, journal and interview data). While the allegations of the public as impediment might hold true in the case of climate change, work outside of the data I analysed shows that all sectors of society are grappling with the issue. While the media sensationalises the politicking occurring particularly by climate contrarians the challenges faced in the health sector make few headlines. Yet, behind the headlines people are trying to instigate change. For example, in 'The Health Practitioner's Guide to Climate Change' (2009), as in the 2010 joint statement by *The Lancet*, *the British Medical Journal*, and the *Finnish Medical Journal* or work by the Climate and Health Council (2011) health professionals are encouraging their colleagues to take meaningful action on health and the environment.

Complexity theory, with its focus on interdependencies, can be instructive in thinking nonlinearly about the relationship between the public health system and the public. As this thesis has shown, these two sides of the population health system are often co-constructive in the formulation of public health responses albeit in uneven and often informal ways. Climate change intimates these two components and raises the issue of building knowledge and translating insight into action. Both in the journal analysis and in the interviews, when discussing strategies for moving forward, one discourse invoked was of messaging. One stakeholder described that a key challenge faced in public health (especially health promotion) is that "of actually communicating messages to individuals in a manner that conveys the seriousness of the issue without actually alarming people beyond what is sensible" (HPA-CDC-M18). One strategy used across the stakeholder groups was to put a *positive spin* on public health messaging about the environment: "I think talking about solutions and positive things [is important], you know, there needs to be counter propaganda saying 'we can do it' and 'look this is manageable these are hard choices but the war is with ourselves, let's wage it, let's do it'" (HPA-EE-M13). Some suggested that as in public health 'wars' against cancer, obesity or heart disease, a campaign of great intensity is needed to put the

natural environment on the health map. Confronting how humans are thinking and behaving (again the evolutionary psychology principle) was key because they are the locus of both personal and social change. Seizing the possibilities opened up by the unexpected, a handful of stakeholders felt that the instability of the current socio-economic conditions opened up space for society to 'wake up':

The opportunity is not just for HPA but for the whole society to make those links now, because of the economic crisis ... We need to make that link, we need to design the economy so that those environmental considerations will be objectively estimated and included and not just be PR. Only then I think the government and the HPA and all the other agencies will proceed at the right speed. (HPA-EE-M13)

While this can appear idealistic thinking, complexity theory points to the importance of looking for opportunities when departures from the norm occur by being attentive to what changes are occurring and cultivating the capacity to improvise, "that is deviate from plans or routines—when events suggest that some new or different behaviour is needed" (Anderson et al 2007). Such a view, then, raises questions about the inculcation of the public health system within larger social ideological systems, which are not about health or medicine at all—at least in the direct sense—but about political, economic, and cultural systems and structures. The social, it seems, is deeply inculcated in the public health sector, making it a system that has to work in the balance between two commitments: one is its role in systems of governance and formal structures, such as the medical system with its practices and protocols, and the other to the public measured in terms of health and wellbeing. A form of theoretical complexification of the situation above could also be generated through using Foucauldian theories of power which would encourage an analysis of the new public health and its role in biopolitics and governance (Petersen and Lupton 1996; Gislason 2010) or the work of power/knowledge in the production of formal and subjugated knowledges within biomedicine (Foucault 2003). While complexity theory does not analyse relations of power it does offer further fodder for thinking about how power/knowledge is enacted within social relations of power to construct and contest the links between health and the environment in the health sector, and how these processes formalise some forms of knowledge and subjugate others. For example, what parts of 'the public' are the social, cultural, political and economic drivers and

where in the circuits of change are responsibility for health and wellbeing being allocated in the interplay between public health and its publics? If the public significantly drives greening responses within public health and at other times impedes them, then reframing the collaboration between the public health sector and the public may be an important component to working more effectively on health and the environment in the social world.

Social inequality, health and the environment

One pattern widely researched in sociology is the persistence and growth of health inequalities, not only internationally but also intra-nationally. When looking at the intersection between environmental drivers and health inequalities one of the often cited examples is climate change and is therefore a good example to focus on. Climate driven health issues range from the increased death rates of vulnerable populations in the UK and Europe due to heat waves through to issues of flooding particularly in low-lying coastal areas in all countries as well as small island developing states (UNFCCC 2005). Sites of extreme temperature variations such as in the Arctic where temperatures have increased by approximately double the global average of temperature rises are also noteworthy (CIEL 2005).

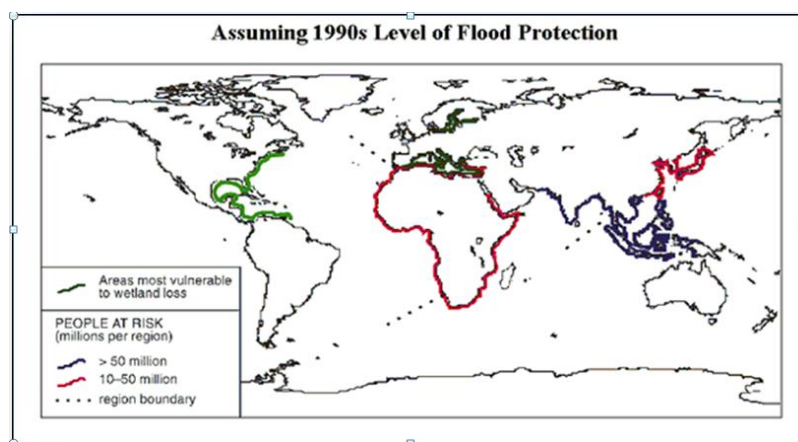


Figure 14. People at risk of displacement due to sea level rise

One shared characteristic of all of these areas is that health injuries are being generated in places where environmental thresholds are being encountered. Some refer to these events as human rights violations because in marginal contexts resilience breaks down quickly when components of the human-environment-health degrade. They are violations also because this demise is driven by social forces often

occurring far away from the sites of suffering, as in the case of the distance between the drivers and the effects of climate change.

Another form of marginalisation also occurs in these moments. As one stakeholder observed when trying to describe what is occurring in these spaces and calculate the impact on both human and natural systems the conceptual frameworks, tools and technologies used to do the accounting shape what is and can be known about a situation:

There are two different knowledge systems from two different institutions. In the past scientists would say that they need to validate Indigenous knowledge. I don't think Indigenous knowledge needs to be validated. It's the knowledge that people acquire within their environment, it's been useful to them. So I think we're learning to allow space from different forms of knowledge to be presented alongside each other or at least relevant to the same topic. But that's a change in the way of working. (Intl-SS-M06)

Complementing this awareness, the journal analysis showed that knowledge held in Earth Medicine traditions practiced by many Indigenous groups and even Complementary and Alternative Medicine is not making it into the scientific canon. As a result, knowledge from marginalised people living in marginalised spaces all over the globe is absent from much analysis. In addition to the human rights dimensions of this situation there are some pragmatic issues such as the fact that the knowledge that is being used is impoverished as the accumulated wisdom in populations who are living in the spaces where environmental thresholds are being pushed and tipping points being nudged are accepted and not available to mainstream science.

In the interview data, however, the examples of health inequalities were not drawn from climate change but rather from infectious disease emergences, particularly in the context of the developing world. Examples given on this subject focused around prevention and health promotion strategies which are often difficult to conduct in areas of poverty and social-environmental degradation. For example, one research participant described in her experience when working in healthy contexts people only need to be immunised once to be inoculated (and do not require booster shots), whereas in unhealthy contexts, vaccines simply don't work:

When you're vaccinating children in communities with unhealthy ecosystems—you have bad water and all these things, the basic immunity or the body system is weakened and so the specific immunities that you're trying to inculcate are more difficult to take hold. So, this relationship between the health status of communities, which is where the medical interventions take place, and the environment matter—and this is a relationship that is now beginning to be understood a little more. (Intl-SS-M06 PE)

Medical literature suggests that there are explanations other than the one given above for why immunisation programmes are not as effective in unhealthy populations, including the long-term vulnerability created by other diseases which lead to physiological damage, such as attack to the lungs during measles. While recognising that in any given situation different patterns may emerge and interventions may be successful, this debate opens up interesting questions about the degrees to which unhealthy ecosystems are adding to disease burdens and limiting the efficacy of health care interventions. The debate also serves as a caution to look for multiple explanations as social and natural environmental processes and events are the stuff of complexity theory.

Using this situation to reflect not only on methodological issues but also on sense making processes also shows that how public health organisations know and learn impacts how environmental health determinants are understood within a public health context. The implication is not that there is a deficit of knowledge but that working on health at the nexus between environmental and social health determinants opens up new issues. Sobering, however, is the time and resources required to undertake such novel analysis. This behoves the health sector to create as a first line of approach a way to identify which issues merit this intensive inquiry (Ball 2006)—ideally a mechanism that complexifies rather than simplifies its approach to the natural environment.

Reading the journal and interview data together shows that while public health initiatives are already working on caring for marginalised people and sociological analyses are generating important knowledge about the links between social marginalisation and health inequalities, much more is needed.

Actual listening and the exchanging of information are essential if the complexity of issues is to be understood. All over the world there are marginalised people whose subjugated knowledges have much insight to offer about the exposure and vulnerability that comes with health injuries produced by environmental degradation and its sequela. Part of the complexification process of shifting foreground and background could be about finding ways for formal, institutionalised lessons to be learned from the health experiences and practitioner knowledge accrued by populations and professionals embedded in degraded environments. To address issues of flooding, therefore, the UK flood planning efforts could garner insights from the technology being developed in low-lying countries such as the Netherlands, as well as from the lived experience of Bangladeshi publics and health practitioners who live in revolving states of infrastructural flood devastation but manifest robust and balanced psychosomatic responses to the situations—a contrast to the UK where the primary health impact of floods is posttraumatic stress disorder.

In addition, the calamity is not only in the profound and unequal suffering that occurs as a result of environmental drivers of ill health but in that modifications in social behaviour (such economic practices) could stem if not stop and even reverse the degradation of environments. Given this cycle, social activity is *prima facie* a health determinant. A pressing public health question, therefore, is how the social and the environmental and the relationships between them will be defined in the social sphere (in the public health sphere and in the civic sphere). Emphasising that this is not only a theoretical question but also an ethical one, one stakeholder described his approach:

I call it 'not on my watch.' If mountain gorillas go extinct in my lifetime what does that say? And I also look at populations of people that potentially are not going to be around. How can this happen in the short time frame of my life ... It is difficult to go out and take these theoretical ideas and see if they are actually going to work somewhere, but it is those sorts of things we need to do. I think that we need to roll up our sleeves and really get active because otherwise twenty years from now we will look at these really elaborate maps and analyses and say gosh we knew where all the human misery was and we knew where all the biodiversity was being lost and that is where it used to be, and then now the human misery isn't there anymore because all those people died and the biodiversity isn't there because it has all gone extinct. I would rather have a thinner CV and have few things on it that included I went out and tried to do something. (Intl, SS – LG)

In addition, in my data the lack of integration of the issue of population and the environment in the public health context (Intl-R-F01) was an ‘elephant in the room.’ Not considering the various kinds of demands different population concentrations and population demographics place on different kinds of environments was also an error of oversight for those discussing the intersection between population and environmental health. The silence on population likewise leads to silences on social, economic, cultural and political factors which shape land use practices, the demands placed on ecosystems services, and the structure of and expectations placed on the public health sector vis-à-vis the environment.

The social, the political and the environment

In the previous section on health inequalities and the environment the critical theoretical concepts of social relations of power and power/knowledge have shown that the social is at work in a variety of ways in linking health inequalities and natural environmental degradation. Theories of power are useful for studying the role of politics, particularly various forms of governance, in the production of the dual injuries to the social and the environmental. Chapter Three, with its focus on the elaboration of the environmental health policy arena, showed that there are myriad policy levers available to address the links between health and the natural environment in the UK.

Not surprisingly political issues were a significant topic in interviews across the three stakeholder groups and this is in part because the public health enterprise has always been entwined with the project of building and governing the social sphere. The interview data suggests that for the HPA stakeholders in particular, issues of legislation were significant. Due to the structure and composition of the HPA, work within the HPA is shaped by legislation (HPA-R-M16). Many in the HPA stakeholder group spoke about the relationship between the HPA, the Ministry of Health and the national government as to them it was at this scale that the structures, capacities and areas of responsibility of the HPA are set. One current expression of these activities is the new protocols being developed around risk and response which have been instigated not only by the challenges of responding to environmental events but also by an

awareness that environmental health issues are having an increasing array of consequences for people in ways that are implicating public health organisations such as the HPA. Two events stand out: the Andoverford fire and the Bunsfield fire, which raised significant questions about the links between human health and environmental incidents. Science and Technology Advisory Cells (STACs) are one way that responses have been organised.

Encountering legislative in other ways, the UK PH stakeholder group described how their work is affected by political agendas. Ways to move beyond the limits in legislation was a recurrent theme in interview. For example, the suggestion was made that the Department of Health has to commit to stop addressing environmental health drivers in a cosmetic or superficial way, or only in an immediate emergency based way, if change is to occur. Another proposal was that the Treasury unbind the Department of Health so that money can be shifted and significant initiatives can be undertaken which reflect an emphasis on health and the natural environment (UKPH-PH-M08). Reviewing how political activity is shaping the environmental public health agenda, a spatial planner working on healthy cities felt that the government was trying to be proactive; it was just getting things half wrong.

Who is responsible for getting things right was a thread running through the data as well with particular attention paid to how to inspire people to care about the issue enough to contemplate issues of responsibility. One doctor, referring to the Natural Health Service, shared that in his experience things look positive because:

a new value in environmental health is being created, and because health is such a strong political driver, it's better than actually [referencing] the environment, because if we say we're going to save a little butterfly or something like that, it doesn't get many people very excited. But if we say the future generation of children will be actually less clever, less able, less developed if we get rid of all the green space that certainly drives hope and interest in a physical system. (UKPH-MD-M03)

That said, not all people in this stakeholder group held the view that referencing the environment is actually leading to action for the environment within the public health sector:

Well it's part of the problem of the government agency, they are all sitting on the fence, that's the issue. The environment agency is charged with the environment, air, water and land and they're not part of the public health team, and that's because the politics is fraud. (UKPH-EH-F05)

Where the HPA in particular, but public health more generally, was seen to be turning to consider the environment, there were some stakeholders who cited the political relations driving these moves:

Having worked in large organisations, trusts, and worked for health authorities, I know that they're target driven these days, the government gives them a target ... and that's where their priorities are and the funding ... if there are some well-intentioned guidelines or statements or policies that come straight from the government, unless there's an absolute target and real motivation to do something about it, I'm not sure how much of that would get done to be honest, I think that would be a secondary issue. (UKPH-SW-M06)

How the government is going about addressing these issues was another topic:

It's institutionally bunk. People have been talking, using the phrase 'joined-up government' for years. A classic instance came up when we were talking at lunch about the fact that the Department of Energy Climate Change has taken climate change outside of DEFRA. Is that a good thing or a bad thing? Personally I see there were two choices, if climate change stayed within DEFRA, either it would have got profiled to the rest of DEFRA, or two they'd have had to significantly step-up the status in the department. So what happened was, 'well we don't actually want to value the environment as a wider thing much, so we'll move it into a different department.' (UKPH-EH-M04)

Considering the scale at which responsibility and action that should be taken in government with regard to public health and the environment, some stakeholders spoke of the shifting responsibilities for public health and the environment between the national, regional and local levels. Achieving balance between engaging and empowering local communities and making change on the national scale was one debate through which discourses of responsibility were developed and volleyed. It was at the local level, however, that most people focused their attention as it is here that public health issues are most directly experienced and in the UK it is also at the local and regional levels that most of the responsibility for environmental health issues resides. The fact that many significant contemporary environmental public health issues are global in scale was acknowledged, such as climate driven newly emerging infectious diseases, as was the idea that their solutions need to be cultivated in the

tension between the local-global (glocal) interface. As complexity theory highlights, local level issues are part of macroscopic issues and the activities (Lee 1997) and responses to them must flow between these levels.

The social and health policy

The relevance of policy to stakeholders' work varied significantly in this study, as did their approach to research deliverables, such as knowledge management, which are designed to translate scientific insights into concrete social and political action. For the majority of people, while organisational mandates and policies did influence their public health work, public policies did not significantly shape their work practices. Yet, in interview many stakeholders suggested that policy was a key driver in increasing attention to environmental public health drivers. Recall, also, the discussion earlier in this chapter of the contradiction that became apparent in descriptions where the public, but not the public health sector, was deemed largely responsible for impeding public health progress, and yet in other data authors and interview participants alike lament the impediments to change and real action on the links between health and the natural environment. Perhaps one of the reasons for this tension, at least within the HPA, is the mandate of the organisation itself:

I think it's driven by the remit of the HPA if you go back to the legislation, to the HPA Act which [was] the law that was passed to form the agency those specific areas are outlined in the Act ... but there is not a sort of holistic policy that outlines what everyone does and how it fits together ... you'd have to go back to the plan of the agencies to see how that's been delegated to get to the bottom of it because it is human nature for people to focus on the areas that they have to focus on without going further up the chain, that's your higher management. It's difficult to reach across. (HPA-S-M20)

As was also observed in the policy analysis, in the UK many policy initiatives addressing the links between health and the environment are occurring under the rubric of sustainable development (see also Stassen, Gislason and Leroy 2010). Overall, it appears that while there is organised and focused activity occurring in the policy arena around environmental health in public health practice there is little trace of these governance frameworks and organisational mandates, whether in the context of

research or frontline response. The interview exchange transcribed below encapsulates the riddle:

Interviewer: It seems that in terms of policy, there is a link between health and the environment that comes under sustainable development policy agendas.

Respondent: Yeah.

Interviewer: So I am wondering if that affects your work at all, that placing of things within sustainable development.

Respondent: No I am afraid not. (UKPH-PH-F01)

This research participant has a degree in policy studies and so the lack of relevance of sustainable development policy to her work is not for a want of understanding the links between public health governance and practice. In her case, she described being involved in developing environment and health policies that were not highly relevant to her work in public health. Part of the issue is the managed process of policy formation:

It is difficult because a lot of the policy depends on what the policy maker wants to say ... The UK government wanted demonstration of serious impacts on climate change to support a mitigation argument, so they weren't that interested in uncertainty to be honest, they wanted numbers. (UKPH-PH-F01)

Generally, the trend seems to be one of taking information from the public health arena and putting it into the social sphere in targeted ways. However, this process seems to be more in service of political agendas than public health needs *per se*. Giving an example from climate change, this participant stated:

We are not at the point of putting anything into health policy. I mean we are just about getting away from the mitigation case, which is all about how bad climate change can be, right. It is a vague policy of sorts but is not very different from saying how should UK health policy change because of climate change ... And so this is only just the beginning. And the fact is that the climate changes now are so uncertain, it would be very unwise to make severe changes because of them. Because you know [the data] are just not good enough. Not at the current level of confidence that people need. (UKPH-PH-F01)

Disconnect between policy and practice in work linking health and the environment also points to other issues, such as the differences in 'policy time' and 'science time.' Not only do policies have a timeline for development, but they also have a marked preference for action in the short-term.

There is also the issue of the immanence of certain environmentally driven health issues, the rapid pace with which ecological factors are emerging and the degree to which they are interacting with one another, creating novel and sometimes unpredictable outcomes. The timescale of policies was, therefore, a topic of importance both in the context of health policy broadly and environmental health policy specifically:

Most health policies are very near term so they've always got some flexibility in them, you know, they can cope with what happens now. Then you often need the longer term planning and this is generally outside the health sector—it is to do with resource management or food management or coastal defence. And these planning issues are being done with climate change taken into account. It's not the same for us [in public health], although there are some examples but that is mostly around heat wave plans and more heat wave plans. (UKPH-PH-F01)

Interview Excerpt

Our government does the same thing with the environment that it does with other issues ... you need very big impacts to get things going.

Surprisingly these are not the impacts that from a public health perspective you would see as the most important. Think about SARS and again, there's been a big drive toward recognition of infectious diseases. The number of people who actually died from SARS is very low. But it was other characteristics that made the problem more definable and a lot of the burden is hidden. We don't often see people hospitalized, the majority stay home a couple of days. So the costs and burden are distributed and hidden, they are more or less considered a natural of part of life. (Intl-MB-M07)

As this stakeholder explains, health policy and public health interventions more generally, tend to be focused on the short term as public health agencies, for example, are constructed as frontline workers. To think longer term about health and the environment in a way that translates into policy was something that tended to happen outside of the health sector. What one international leader described he would like to see is:

That the food and agriculture organization, the world organization for animal health, the World Health Organization, UNICEF, the United Nations children's fund—because children are often at the risk—the World Bank and some of the regional development banks start to see how they as institutions can cope with this convergence of issues around risks at the interface between animals, humans and the ecosystems in which they live. (Intl-MD-M11)

The need for longer-term data sets is part of the challenge in reconciling the different time scales. Robust data on environmental drivers often requires data sets of over 30 years or more depending on the issue. While some of this data exists in scientific archives, much of it has only been collected recently as environmental fluctuations (risks and hazards) have become important enough to health to attract funding and sustain long-term research programmes making it safe for people to build a career in this area of inquiry. Some of this data also exists in narrative archives, for example in the stories and traditional practices passed down for generations in Indigenous communities. As a subjugated knowledge, however, there are challenges around how to make this knowledge 'count' within scientific research and so typically it does not inform mainstream policies. Again, this issue points back to considerations of power/knowledge and the links between socio-political and economic change and changes in the valuation of certain forms of knowledge and worldviews.

Moreover, there is also a timeline for policy implementation. One stakeholder described his experience this way:

I don't think that is specific to the environmental health field, it is a general public health strategy. If you are a practitioner you're asked to combine compliance with policies coming from the government with discretion and professional creativity in adapting those policies to the local circumstances and I think in doing that you have some discretion that goes to the point of really shaping the policy. Do you see what I mean? It is not so much in the formulation of the policy but more in the implementation. (IntI-SS-M06)

The ability to understand and incorporate complex issues, such as the element of uncertainty, is important to the policy formation process. Contending with issues of uncertainty is certainly a hallmark of health issues produced in the interplay between social and environmental determinants. As noted elsewhere in the thesis, issues of complexity and uncertainty also raise questions about the place of the precautionary principle, which states that in the face of uncertainty, actions that err on the side of protecting health and wellbeing should be taken:

At some point people have to talk about being more comfortable with uncertainties and recognizing that when you make linkages in complex systems, they're not going to jump out at you—because they don't jump out at you. It's harder for the general public and other scientists to be so thoroughly convinced

and this is where I'd say we have a whole lot of work to do and of course every scientist and their mother says yes we need more research and that's what we're doing. (Intl-MD-M12)

Some movement in this direction is occurring in the UK but these kinds of changes are based, at least sometimes, on chaotic patterns which are hard to translate into scientifically informed policy:

[The government] is now doing risk assessment so they were asked to take uncertainty into account because that is more about local decision making and adaptation decision making where you do need a bit of uncertainty. So things are changing. We will have to see what they do, but we do try and talk to them about uncertainty but generally they are not very good at understanding it, which I think is a general problem. (UKPH-PH-F01)

While policies need time to develop, so too do the organisations that drive them and who are seeking to implement them. The constantly changing structure of the health service in the UK was one issue discussed in both Chapters One and Three as impacting knowledge formation, management and the actioning of environmental health insights. This is also a theme that emerged in the interview data. As governmental departments' mandates relating to environmental health shift between levels of government, the roles, responsibilities and remits of people working in the health sector, including the HPA, Primary Care Trusts and local authorities, are constantly under construction (HPA-S-M20). Outside of the health sector, socio-political forces organise and reorganise public health responses to environmental drivers, even at scales that affect policy:

The chief medical officer's vision for emerging infections and health protection as a whole ... was late coming out because 9/11 happened. He'd been to the States and seen what was happening with West Nile, and I think this influenced him a lot too. Because if you read that document, you can see the bits he put in much more on the threat of emerging infections such as West Nile Virus and also the deliberate release of terrorist threats. (HPA-MD-F03)

In the interview data, more than once the prescience of an issue seemed to drive not only the formation of policy (as in the case above) but also work in the field, as did perceptions of immanence which were often interpreted as akin to urgency. There is an interesting 'looseness' at work in what guides organisational as well as individual practitioner responses. This looseness may be called things such as 'best practice',

‘expert judgement’ or ‘front-line response.’ An observation in complexity theory within health organisations is that self-organisation and emergence are on-going dynamic properties of organisations which are themselves systems nested within a larger network of systems:

You must not let the formal organizational documents and policies mask the nature of the organization, which is defined by the informal organization. The organization ... is not something that is; it is something that is becoming. Applied to health care organizations, the concept of emergence will draw the researcher’s attention to such things as the “informal” organization ... is spontaneously occurring organizational events, structures, processes, groups, and leadership that occur outside of officially sanctioned channels. (Anderson et al 2007)

Some stakeholders described that apart from informal influences, policies or programmes not necessarily related to public health also inform their work. For some it was tools such as the European Commissions’ Strategic Environment Assessment (SEA) Directive, which they brought to their public health work by way of training and work in other fields. For others it was civic actions and social movements which ranged from the general culture of the 1960s (UKPH-UP-M02) through to the Women’s Health Movement of the 1980s in the UK (UKPH-PH-F04). In these cases, a policy limitation was considered to be instances where the policy arena was unresponsive to social trends which were not attracting significant public attention. Yet, as one educator, researcher and executive stated, it is not enough “to change public attitudes, because if you have a policy change the public attitude won’t necessarily change” (Intl-V-M01). Others in the international stakeholder group spoke about how fickle the policy arena can be. A wildlife veterinarian offered the example of zoonoses (diseases transmitted from animals to humans), which had just been the subject of recent policy campaigns:

Lately they have actually gotten the ear of the people and the policy makers. Avian influenza is the number one thing that’s done that. We’ve been talking about zoonotic diseases for 20 years and then all of a sudden with avian influenza our budget went through the roof just to work on this one disease. We’re saying, that’s great but keep in mind that there’s all these other interactions ... But it’s gotten the public ear and so we’re trying to use it as a platform to reach out and expand people’s minds. (Intl-V-F05)

Another dimension of these challenges is the need for policy to simplify complex issues, as was the experience of one physician working in international health:

With the EcoBioSocial approach we work concretely towards the Millennium Development Goals. This is tricky because the policy makers and governments want a simple approach that is about how many lives and how much money will be saved. It is difficult to answer these questions because the EBS is long-term and looks at economics, the environment and biological aspects of things as well at social and behavioural change. (Intl-MD-M09)

There was also the issue raised of the ways in which policies are not *joined up* between governmental and private agencies, as well as between people—an issue that, at least for some, represented one of the most serious public health issues. Speaking about the area of food policy one member of the UK PH stakeholder group reflected:

Policy effort to tackle food-related non-communicable diseases has been limited to health promotion via soft policy levers such as education. Is it any wonder that educational programs have struggled when competing with the might of food industry marketing? If we are serious about altering diet-related ill health, action needs to be coherent across all levels of existence ... The point is that nutrition needs to be based on environmental principles. (UKPH-PH-M05)

Making policy that matters was another theme that emerged, particularly for those in the International Stakeholder group. Participants offered a variety of tactics ranging from analysing and understanding the impacts of existing policy frameworks, which can channel practice and produce outcomes that are counterproductive, to achieving health and wellbeing for populations. One person in the International Stakeholder group pointed to trade policy as interfering with environmental policy objectives:

Policies make it easier for a developing country to import microwave popcorn than to sell their traditional grain using a traditional production system. The trade policies are more aimed at allowing the penetration of products than to provide incentives for sustainably grown foods. It shouldn't be just an issue of humanitarianism or goodwill, it should be an issue of common sense about health and the economic systems that we want to promote. (Intl-SS-M06PE)

When I queried participants about specific documents on health and the natural world which use ecological models the recognition of the models was nil. For example, in interview, I asked an expert in the HPA on zoonoses (HPA-MD-F03) whether she is

familiar with the veterinary movement of 'One World, One Health' and its work on how to link animal health to human health. She was not. While not a set of policies but rather a philosophical and methodological approach for making the links, this document is considered by some to have important implications for how the relationship between human and animal health, both in domestic and wild settings, can be conceptualised. Given the breadth of activities this public health researcher and project lead, her lack of familiarity with this integrated veterinarian movement exemplifies a missed opportunity. She pointed out in interview that taking the view of human-animal health connection is 'best practice' and therefore not an issue to debate.

There is a wealth of information being developed on the connections between human, domestic animal and wildlife populations, which are linked by current and potential disease movements such as Avian Influenza, SARS or Mad Cow Disease (OHI 2011). 'One World One Health' is a formalised movement which emerges out of the animal health sciences. The EcoHealth Alliance takes a complementary view of interconnection between humans, animals and environments but emerges out of the human health sciences. These approaches are increasingly being considered in some public health agency contexts such as the CDC and the Consortium for Conservation Medicine, which is associated with public health universities such as the John Hopkins Bloomberg Public Health School. The creation of these health movements can be read as having emerged out of the ways in which contemporary health challenges have begun to overwhelm various health sectors working in isolation from one another. As in the case discussed by many research participants, the ability to effectively work in the nexus between health and the environment is shaped in part by scientific capacity and technology as well as by political will. As the section below discusses, economic factors and the social relations through which resources are produced and distributed also shape what is possible.

The social through economics

The links between economics, the environment and public health are amply considered in all three of the data sets presented in this thesis, with the overarching conclusion emerging that economics maps onto most key issues. In contrast to the topics of inequality, politics and policy the stakeholders in this study needed no assistance from the authorial hand to make the connections—they understand the complexity with regard to the economic-environment-health interface. As I show in this section, the range of issues they discussed included the role of funding and resource allocation, and translating observations about the links between health and the environments into formal knowledge. Swaying public opinion when economic benefits or deficits were attributable to a ‘green’ health agenda and issues of morality, values and ethics were other subjects touched on. A theme running through the gamut of observations was how cultural ideologies and practices influence the ways health issues are addressed when economic issues are in play.

How economics ascribes value to health and to the natural environment and therefore how it influences the esteem given to environmental health issues was a central frustration, particularly when stakeholder efforts were either formally or informally rebuked. Like contemporary thought, neoclassical economics (the present day form of mainstream economics) traces its roots to the 18th century, which is the context within which value theories were developed. Recall Chapter One where Marx and Engels are cited for their observations about how nature was devalued within this economic framework and humans were alienated from nature through means of production. The bifurcated notion of value which increasingly drives the organisation and functioning of the health care system in Britain is based on these normative neoclassical assumptions about reality. To his delight, and in contrast, one HPA stakeholder described encountering Ecological Economics, which addresses the interdependence of human economies and natural ecosystems as they interact over time:

I found this beautiful book ... by someone called Herman Daly. He is a so-called ecological economist but really he has something very deep to say. It was possible for the economists to ignore the natural world and the people in it because there was a super abundant natural world but now that is not true,

you cannot ignore it anymore and not just the natural world, people too.
(HPA-EE-M13)

This 'green' economics—a transdisciplinary approach built from insights generated through post-normal science, sustainability science and ecology—offers an alternate way of viewing the economic dimensions of public health activities working on health at the nexus between the social and the natural environmental. A turn towards ecological economic principles when trying to involve the public health sector in generating sustainable societies, health care systems and healthy environments would require engaging with a variety of obstacles. For example, in interview some used a discourse

of pragmatics when discussing the links between health and economics and concluded that overall, maintaining business as usual was the best way to protect public health. They spoke about the delicate balancing act when working in public health (HPA-HP-M01) between long and short-term health interventions:

To actually put health as a greater priority in the agenda [is difficult] because it damages business interests. But the environment is important. For example, I was at a power station yesterday on the coast and we were trying to consider if a major hydraulic event occurred, where would the contaminated water go? It was obvious that it would have no option but to go to the sea. This is a public health and environment issue. We live off the sea, people work in the sea, people use it for pleasure, it goes into the food chain and we eat fish and those things have a big impact on the silent killers, endocrine disruptors ... then we wonder why people are sick? (UKPH-EH-F05)

What it took in economic terms to convince decision makers and treasury administrators to spend money on health and the environment was also another theme. SARS was cited as an exemplar, as economic devastation occurred in Canadian

Interview Excerpt

I was in a meeting yesterday we were talking about flooding inputs and the lady from the environment agency said she wants to spend money on a health economist to redefine the methods by which we estimate how much money should be spent on flood defences. The methods we currently have, in her view, underestimates what should be people's concern. [She is interested in] the willingness to pay methods, you know they say that on average people are willing to pay two hundred pounds one off for the flood defences, but is that a realistic estimate of what people really would spend? And, it all depends when you ask that question... (HPA-EE-M13)

cities when fear about SARS led to dramatic declines in international travel. These socioeconomic impacts helped to put SARS on the economic radar in Canada and, coupled with the public health consequences of Canada being a significant site of emergence for this disease, made it an important issue for public health:

On the human health side the thing that really made a difference I think was SARS, you know ... when you've got a really important disease that costs \$50 billion or whatever to the global economy and killed people and caused a social disruption in Toronto and Singapore, the idea that it came from wildlife ... is just driven home over and over again with emerging diseases. HIV, Lyme disease, SARS, Ebola, the big scary ones tend to be wildlife diseases. I think eventually there was a grand shift. West Nile was a big issue too in the States because that's a wildlife disease essentially, although they get into people. So I think that group of diseases made a grand shift that allowed people to begin to work on things like that and get funded. (Intl-MB-M05)

Equally, neo-classical economic arguments can also block issues from being ascribed importance. Elsewhere in this thesis I have used climate change to illustrate the ways in which social forces shape the construction and contestation of the links between anthropogenic activities and their environmental health outcomes. Normative ideas about economics shape both individual and organisational engagements with climate change and its links to health. As one stakeholder recounted: "the first argument of the Clinton administration was that it was too costly to have climate change ... if you think about the biosphere and the ecosystem services provided, however, disrupting those services is perhaps the most economically risky proposal ever" (Intl-MD-M03). Protection for the environment, arguably a key health protection measure, becomes difficult in this ideological space and in a specific twist this is felt doubly in the UK health sector. There are challenges encountered not only at the national level but also at the local level where responsibility for environmental health issues largely resides. Therefore, even when legislation to protect the environment exists it cannot be comprehensively upheld by regional governments, who have a funding deficit and cannot comply with many of the regulations themselves, let alone enforce them:

Unfortunately it's local authorities who are so cash-strapped. And a whole other thing: I've been going to the resourcing of local authorities and public sector organisations; they're so cash-strapped, they hardly get time now to even comply to certain legislations let alone anything else. (UKPH-EH-M04)

Trying to influence the interplay between moral value systems and economic value systems was another theme that emerged in interview:

It doesn't come to dollars and cents it comes down to human lives human health ... I remind myself. We will get twenty thousand dollars a hectare for cutting the trees on this lot ... however, what we need to say is 'well you will kill a bunch of children in the process' for all intents and purposes. Can you make that decision or can you come to another way of maybe either reducing your harvest or change the type of development that you've proposed. (Intl-SS-M06)

Another example came from Europe where economic imperatives not health considerations were seen to be driving decisions. The example given below is from an interview that references the food industry but other industries were also discussed in interview for similar reasons:

I think when you look at the food safety fields and traders I think the dominant considerations are economic strain and public health response. For example, see the debates about the American chlorinated chicken this last summer, it was very clear at least in the Netherlands that one reason for the industry to be against this chlorination is the fear of local pressure from the US

Interview Excerpt

So I think what happens is when those people leave those areas, they are leaving behind long-term relationships [with place]. What remains is not a vacuum. Other people come in who don't have that long-term relationship, that long-term investment with that landscape, and they begin to do things without concern for the environment. So they'll take a coastal area, like the British Isles which might have been about gathering kelp and seaweed and harvesting them and they'll set up a salmon farm. Then the industrial production of salmon and trout will bring all manner of diseases, so they'll begin using antibiotics which then go through the human food chain. Maybe if we found ways of keeping those communities of kelpers in those areas they would have been much better maintained than leaving them no option but to migrate somewhere else and having some company come in and set up a salmon farm or a trout farm in that coastal area.

The same goes with tropical areas. Where people are moving out they now have shrimp agriculture. If the forest people leave, then logging companies move in. We have very few places in the world where humans have not in some way shaped it. And, yes, most of the interesting ecosystems have a human element within them. So, if we keep people in those areas we maintain this long-term cultural investment in those areas. I think that we can preserve these places and practices and allow people to evolve. (Intl-SS-M06)

and other countries on the European market. So I think a lot of this is driven by trade and economic considerations rather than by the health investigations. (Intl-MB-M07)

The international stakeholder group also reflected on the role that value systems play not only in society but also in how social norms and values are expressed through public health policy and practice. These participants also viewed economic systems to be a kind of value system. Speaking from a meta-perspective one stakeholder suggested:

As I looked at the human-animal health relations, not just on avian influenza and pandemics but on a number of other issues, it became clear to me that we also need to look at them within the context of people's livelihoods and particularly the incentives that people pursue when they are trying to maintain their livelihoods, which sometimes leads them to adopt practices that are potentially harmful for animal or human health ... We need to put all this in the context of an increasing world population [which equals] increasing demands for meat, which in turn leads to increasing the mass production of livestock, often under situations of low biosecurity. And then another dimension is the changing world climate, which, will lead to warming and then different patterns particularly of insect activity that will also affect health. (Intl-MD-M11)

Offering a concrete example of how this big picture observation reflects the reality of working on public and animal health issues in the field, another stakeholder suggested: "As long as our value system is monetary then it is very difficult for us to move in a certain direction ... to have growth in harmony with wherever the resources are. When will we value that as much we value well money?" (Intl-SS-M06).

In a related sense, some also discussed the links between economics and culture. In more traditional cultures, this link is significant to socio-cultural processes like identity formation, social cohesion and exchange:

Bush meat is a huge issue for us. Maybe it's just sort of a cultural preference, but a lot of times it's just driven by economics or trying to put food on the table. So we work a lot with people so that cultural and sort of spiritual and also their livelihoods are taken into account. We work a lot with their livestock and agriculture, teaching them how to take care of their livestock better so that they could produce better so that those people are healthier and have better livelihoods. None of this has to do with zoonosis, it just has to do with ensuring that people in those poverty stricken areas are empowered to use their land in a positive way and to have good economic [situations] and well-being. (Intl-V-F05)

How to make the most significant impact with the funds available was another issue:

In all the developed countries you can add a lot of money and only gain a little bit in terms of human longevity. Well part of this is biological, because we wear out after a while and so on ... but the fact is that you can get a lot more bang for your buck. You can almost double people's life expectancy in some cases by adding a few dozen dollars of gross national income purchasing power [to certain interventions]. The fact is that it is certainly well beyond a lot of countries and probably well beyond a lot of development agencies, to do that. (Intl-SS-M06)

Funding issues were a significant topic of discussion for participants in the UK PH and International stakeholder groups, especially how funding criteria shaped knowledge formation and distribution priorities. One aspect of this issue was who was offering the funds and who manages the money. Certain issues were also seen to be attracting the most resources: "at the moment lots of money goes into these high tech accident and emergency treatments and heart disease and the Cinderella services are mental health and stress ... but I see no great policy initiative to you know, to tackle that" (UKPH-EH-F05). For others, a related problem was that researchers were seen to be *following the money*, leading to situations where research subjects attracting new resources would also draw researchers who may not have previous interest or experience in a subject but use other forms of social capital such as reputation or seniority or affiliation to attract funding:

Interview Excerpt

Just recently the PCT's have now been split into the commissioner and the provider arms. And Public Health has been moved into the commissioning arm and now is the commissioner to all intents and purposes ... I think there was a missed opportunity which was World Class Commissioning ... we should be commissioning across organisations, working across traditional boundaries. But the actual focus is still on the clinical aspects of alcohol, obesity, smoking, all those things that result in a clinical outcome and have a clinical input from which to cure or resolve the outcomes. And I think that public health has not really got to grips yet with everything else that they could do. If they don't start making change soon when they come to reorganizing all of this provisioning they'll just be re-commissioning the same old, same old... (UKPH-SS-F03)

Everybody these days wants to have a little piece of the big climate change cake. So there are quite a few people who link for very good reasons their

research and their initiatives to the issue of climate change and the very great reputation in my opinion of the IHDP assessment is certainly has a big pull factor for people to, for example, lobby for special reports and chapters within overall assessment reports on a certain issue such as health. (Intl-H-M13)

The priorities of funding bodies are a clear example of how social forces play out within relations of power which not only are shaped by notions of public interests and societal needs but which in turn also shape these very same 'forces'. Noting where the money is and where it is going helps to illuminate the concrete practices, relationships and forces that are at work in the social world and the construction and contestation of the natural world as being related and consequential to health and wellbeing.

Health Determinants

Traditional approaches to health determinants within public health are generally fashioned on practices of categorisation and classification and are methodologically organised around individualising and totalising summations. While these four concepts can be defined within critical theory as Foucauldian 'techniques of power' (Gislason 2010) conceptually they are also based on principles of ordering and contrasting, which are by-products of dualistic and mechanistic framings of the world. When studying health at the interplay between social and natural environmental drivers, however, the nonlinearity of the interaction between complex human systems and multifaceted ecological communities and processes contrasts with the tidiness of the discrete categorisation of health determinants into the social and environmental. As discussed in Chapter One, 'the social' is a phenomenon that is created through individual or collective human activity and which, in turn, plays a role in producing the social world. Within public health apparatuses, the social is expressed through ideological and epistemological frameworks, social mores, and public health cultural facts and customs working together in the construction of approaches to health work, which is perceived to be impacted by environmental drivers. All together these forces (visibly and/or imperceptibly) regulate what matters and how what matters is defined as a health determinant. In the literature, one tension in public health that was discussed was the commensurability between the approaches classically used within

public health of 'risk factor' and 'social' epidemiology. As suggested in Chapter Three, some of the questions that arise out of these tensions are: Can wholes can be 'reduced to' their parts? Are objects 'real' or 'constructed'? Is science 'objective' or 'value laden'? One way to move beyond the binary construction of these debates is to step into linking, connecting or systems approaches to sifting through the issues. In this way the binaries, and the tensions between them, become more generative. That is not to say 'anything goes' but rather it brings into the equation considerations of both the biological and the cultural drivers in a disease emergence and then opens up new questions about how to find ways to create order and make sense out of the multiple activities occurring.

Conceptual models are one way to help one know and understand the subject matter they represent. Two of the key models of health determinants within social epidemiology have been the Dahlgren and Whitehead (1991) "The Main Determinants of Health" Model and its successor the ecologically informed 'Health Map' (Barton, 2005). For the purpose of this research the key difference noted is its approach to conceptualising the natural environment as a health determinant. Hugh Barton's 'Health Map', draws on the Dahlgren and Whitehead framework but a significant difference between the two models is a complexified study of the outer strata, the meta-context within which health unfolds, with Barton identifying the Ecosphere as the largest scale of health determinants (Barton, 2005). See below for an illustration of both models:

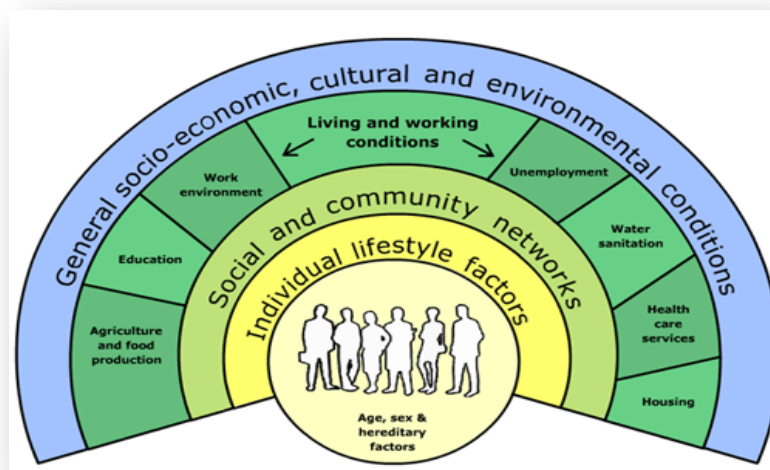


Figure 15.
"The Main
Determinants
of Health"
Model
(Dahlgren and
Whitehead
1991)

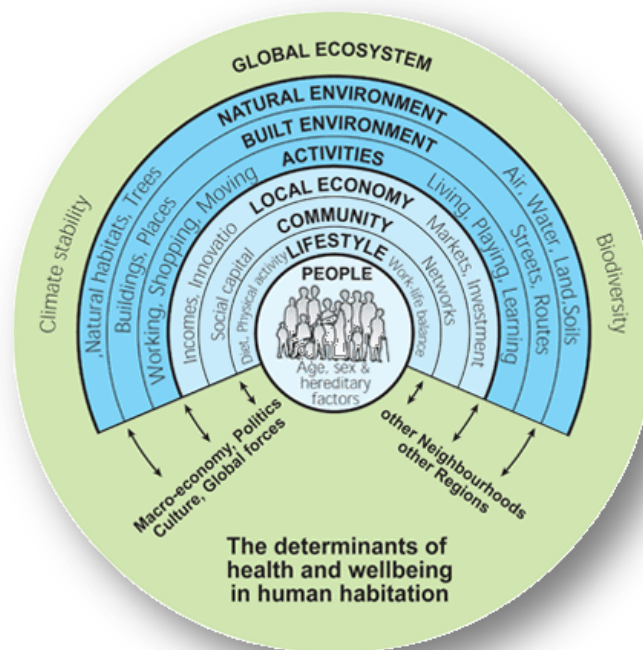


Figure 16. 'The Health Map' (Barton 2005)

Noteworthy in Barton's Health Map is that health drivers are not only biological processes and social ones but also the composition of the planet itself: the lithosphere (rocks), the hydrosphere (water), the atmosphere (air) and the biosphere (life). Alongside this is an acknowledgment of how entire social spheres, such as the economic sphere, act as health determinants (Barton 2005). Barton describes this as a model that "combines an eco-system analysis which expresses the relationship between people and their environment with a public health approach which identifies the relevant social /environmental determinants of well-being" (Barton 2005). Given what I have come to understand about the construction of the environment and ecology in public health theory and practice and the present practices in epidemiology around health and environmental drivers, what I see instead is that epidemiology is still developing the tools to think at the scale of the ecosphere and that the public health sector alone should not be left to identify health determinants.

Also inspired to bring ecological principles to work in public health notions of health determinants is the work of Rayner and Lang, who organise their thinking around the

spheres of the material, the physiological, the social and the cultural-cognitive. They are building on a less-disciplinarily focused environmental perspective in public health, which was a form of biotic environmentalism (championed by people like Chadwick). A continuity of thought they draw on which links the natural environment to human public health has its antecedents in Victorian public health and current expressions in ecological public health. Building on the introduction of ecology into health by Aldous Huxley in the early 1960s, Rayner sets the scene: “the notion of an ecological public health has, by degrees, entered the mainstream but without being articulated as such” (Rayner 2009, p. 589). Their collective project is a model of ecological public health which builds on the ‘social-ecological model of health’ enunciated in part by the WHO’s Commission on the Social Determinants on Health, as well as through social epidemiology and eco-theories of disease. What they are interested in (both together and separately) is that people and the environment are the nodal points for public health (Lang 2009; Rayner 2009). The model they conceive has four interdependent dimensions or ‘worlds’:

The category ‘body’ becomes that of physiology; the category ‘environment’ is separated into material world (thus incorporating ‘natural ecology’) and social world, representing systematic social structures (thereby largely outside of individual control); while the category ‘behaviour’, which has subjectivist overtones, is conceptualized through a meeting of the psychological and sociological concepts of ‘cognitive and lifeworld’, thus addressing categories of mind and culture. (Rayner 2009, p. 589)

As Rayner (2009) describes it, the model encompasses both natural ecology and human ecology but in each respect acknowledges interdependency between each of these dimensions. Additionally it builds in history and time effects and seeks to apply this perspective to specific economic and policy issues. Rayner and Lang also encounter challenges in their work, which echo those discussed in this thesis, with two central trials for them being the wooliness of the issues and the complexity:

often shown in diagrams representing multiple layers of influences radiating out from the individual or group—only to be defeated by it. A second problem is identified by how ecology in public health is still mostly defined: as social ecology; with, at most, ‘the environment’ tacked on as a mediating layer of influence. (Rayner, 2009, p. 589)

This is an important piece of work as is the weight of the declaration that “the era of ecological public health is upon us” (Rayner, 2009, p. 590). Again, the issue of complexity arises, particularly in this case, when working in the collision between natural ecology and human ecology. However, one of the issues impeding forward movement is that while they have brought nature to the fore in their thinking they have not decentred the human within the public health framework and therefore it is difficult to move toward concentric and intersecting conceptualisations of health drivers. The later would be, in my estimation, an ecological approach.

Conclusion

This chapter has drawn on theories of complexity to study the relationship between individuals and social structures as they are expressed as social systems and social organisations, such as the health care organisations. This analysis has shown that the public health system is not a “well-oiled machine” or a seamless bureaucracy where parts and people can be replaced and the same job will keep getting done.

There are also drivers outside of financial incentives, best practice initiatives and regulatory policies which motivate change within the public health sector (see Anderson et al 2007). The challenge for the public health system of addressing the complexity of health at the nexus between the social and the environmental has also been discussed. Returning again to the framework of constructs, within the public health system health is produced by social, cultural and physical factors and can therefore be thought of as a socio-cultural-physical construct. There is also a complex interplay occurring between the material and the discursive, between the social and the biological, between social systems and processes and ecological ones when health is addressed in the nexus between the social and the natural. Given the materiality of the interrelationship between the social and the natural, there are conceptual problems that occur when the material world is not seen to be comprised of natural elements (such as air and water) and ecological processes (such as ecosystem servicing). When these oversights occur, building a robust understanding of the ways that social factors are driving environmental illnesses is not possible.

An opportunity to rethink the social is also lost when analysis across scales is not conducted. This slippage was particularly evident in discussions of ‘the public’ where the tendency was to focus on the individual or a homogenised quality of the collective, such as a collective psychology—as is the case when thinking of the public as a grouping of humans which are *a priori* determined by ‘human nature’ which is resistant to change. Finally, considering the role relations of power play in shaping social structures, discourses, priorities, ideologies, or political and economic practices was another theme in this chapter. As excerpts from interviews with the three stakeholder groups have shown, all of these relations of power are relevant at one time or another to the construction and contestation of the links between health and the environment.

Chapter Eight

Discussion and Conclusion

This thesis shows that human and natural worlds continue to be deeply interconnected. Studying the complexity of illness phenomena reinforces that the unit of survival is human and environment. Using the social to understand health in the human-environment nexus brings to life the role of the human world within biological communities and processes while also celebrating the biological dimensions of humanity. The unit idea is interconnection. Acknowledging that humans are related molecularly to the cosmos, biologically to other biotic beings, and chemically to the earth (deGrasse Tyson 2009) was the starting point of the study. This thesis then analysed health in the Anthropocene and adds to biologically grounded insights the acumen that humans are influencing how the biological, the chemical, and the atomical are connected and therefore the kind and quality of life on planet earth. The conclusion drawn is that the social is the most significant health determinant of our time. The project has been to use critical theory to challenge conceptualisations of ‘the social’ in order to reconfigure what is meant by a ‘social determinant of health’ so as to reflect this awareness within social epidemiological health studies.

Remembering that holism—the appreciation of the congruence between bodily and cosmic order (Samson 1999, pp. 3-4)—cohered the worldview of the Western world and its healing traditions for millennia, this thesis revitalises this concept. Tracing the notion of holism through social as well as medical history, through Marx’s notions of interconnection and alienation, through Durkheim’s organic solidarity and through systems based thinking more generally has enabled not only a critique of the production of the modern world but has also identified a tradition within social theory of considering the production of social phenomena as humans and nature co-create reality. It has been possible, therefore, to be curious about but not seduced by dualistic conceptualisations of the social and the natural and to appreciate the generativity of working in the spaces between these binary frameworks.

Atomised thought has produced exquisite human insight into the natural world and enabled biological medicine to heroically extend and improve the quality of life for many. Yet, where there is a binary construct there is a space between the binaries likely in need of attention. One such gap is the product of humans' obsession with constantly pushing at the frontiers of hominid existence without also paying due attention to the toll of development and innovation on the natural world. This thesis contends that current trends in illness and disease show that the distances in time and space between human activity, environmental degradation and illness and disease outcomes are compressing and the disease pathways are becoming more direct. As the gap closes, the issues intensify and there is an onus on social thought to address the issues borne of an era where "humanity's use of the biosphere is no longer sustainable" and both the natural and the social worlds are losing resilience which is "the capacity of a system to absorb disturbance and still retain its basic function and structure" (Walker and Salt 2006, pp. viii-xiii). Finally, this thesis has been premised on the belief that while the health phenomena of this era (as described above) are significant, human's capacity to ameliorate them at their source is also considerable.

The purpose of this final chapter is to offer summative and concluding thoughts on the outcomes of this research project, with a focus on the theoretical, methodological and empirical contributions to larger academic conversations and applied contexts. This chapter, and ultimately the thesis, comes to a close by identifying areas for future inquiry.

Theoretical Contributions

Rethinking the sociological imagination

Within sociology, the project of rethinking the social is not new, to the point that it becomes cliché. A review of suffering in the social world and the anthropogenic drivers of many environmental health issues show that what the social means and how the social is being produced still need to be contemplated and new practices developed. The technicalities of how to think through the social is also a well-rehearsed subject in sociology with the sociological imagination often invoked. This thesis has also

gravitated to this well-worn concept, including its demarcation of the social world into personal troubles and social issues and the earnest project of using the two to illuminate the social world (Mills 1959) which reflects a

capacity to shift from one perspective to another—from the political to the psychological; from examination of a single family to comparative assessment of the national budgets of the world; from the theological school to the military establishment; from considerations of an oil industry to studies of contemporary poetry—it is the capacity to range from the most impersonal and remote transformations to the most intimate features of the human self—and to see the relations between the two. (1959, p. 13-14)

Using the concept of health to rethink the sociological imagination has precipitated the relevance of the natural environment to the social world while connecting this awareness to debates already underway within social theory, including those which are trying to update how the social is imagined in order to create a more deft tool for understanding and ideally improving the contemporary condition. Unlike many other ‘rethinking projects’, throughout this thesis social forces are shown to damage the natural environment that is implicated in harms to human health—a dynamic which means that through health the social and the natural environment are intrinsically bound together. For the sociological imagination to be useful to this analysis, therefore, the interconnection (and not the separation as Fuller (2006) advocates in his ‘new sociological imagination’) is an imperative conceptual ingredient. Such a framework allows for a study of the complexity of the issues and shows, for example, how health injuries driven by the natural environment are one form of personal troubles that link to social issues and *vice versa*. This observation is true not only in terms of how environmental damages are related to health injuries but also in terms of the particular challenges natural environmental health issues pose to social structures such as health care, government, and emergency systems responsible for the containment of widespread natural environmental tragedies and their health sequela. A contribution of this thesis, therefore, has been to demonstrate that a shift in the orientation of the sociological imagination is necessary, as with each progressing decade the interplay between the social and the natural environmental is increasingly iterative, complex and unpredictable and, consequently, inextricable. Certainly, if the project of sociology is to assist in refining the project of humanity in order to extend

human survival then a rethinking of how *Homo sapiens* ('man' the wise) lives on this earth requires much less of Fuller's 'anthropic' approach and much more of a sociological imagination informed by 'biognosis'—knowledge from life—which is gathered from the wildness of the world (Buhner 2004, p. 3) and humans' understanding of the interdependence of social practices with natural processes.

Expanding on the environment using ecological principles

Throughout the theoretical and empirical data presented in this thesis, the environment has been constructed through dichotomous frameworks which juxtapose the social with the biological or the natural and are incurious about their interconnection. Such dualistic, even dead, frameworks are antiquated in the current age of complexity, as is expressed poignantly through global environmental change. In addition, while health research has remained largely silent on health and the natural environmental issues, other areas of social theory such as research on risk society have used the environment as an exemplar of how natural forces are infiltrating social spaces, organising and reorganising them, as they are a force which can make human interventions inept, for example in the case of extreme natural disasters. In human terms, this is noticed most acutely in the form of infrastructural collapse and human illness and disease.

Given the propensity to stagnate into binary constructs and into a passive construction of the natural world, ecological concepts emerge as a more potent conceptual framework for social theorising. Concepts such as ecosystems extend the view of the social by drawing attention to interrelationships and exchange and in this way connect back to the Latin notion of the '*socius*', which is community. Thinking about the social as an assemblage, a community of biotic and abiotic components, enriches the metaphors available within social thought. More to the point, however, it improves capacity to analyse the contexts within which the social is produced and to engender a realistic accounting of the materials upon which the social is built, which include not only ideologies and discourses but also biotic matter, chemical compounds, and natural elements such as air and water, all housed along with humans in the meta-

context of the ecosphere. In terms of theory, this is working at the interplay between the material and the discursive and in the nexus between the social and the environmental. As such, this thesis breaks ground for further social scientific studies of health and the environment and substantiates the call for an extended notion of the 'environment' using ecological principles.

Reviewing current conceptual frameworks

While this thesis is working in the spaces and tensions between concepts, it is not working in a conceptual vacuum. On the contrary, it is through the systematic review of a significant amount of literature on the subject of health, the social and the natural that this project is built. A theoretical contribution this research makes, therefore, is 'conceptual connectivity' by way of discourse analyses across social and public health approaches to health studies. Connecting disciplinary projects and discourses has shown that a range of ideas, vocabularies and methodologies are being used to evaluate the relevance of the natural environment to human health. Relatedly, health-environment conceptual frameworks are shown to be built within the confines of the social structures and social relations of power producing them, including public health systems and disciplines. Cutting across disciplines and organisational functions it appears that there are six basic frameworks organising discourses and practices vis-à-vis the social and environmental determinants of health in the data collected for this thesis: 1. Governance Approaches, 2. Purist Approaches, 3. Contextual Approaches, 4. Linking Approaches, 5. Connection Approaches, and 6. Systems Approaches. An analysis of these six frameworks shows that while each one constructs how an 'environment' matters to human health, once defined, the 'environment' becomes a bounded concept within the framework and constrains the work done through that structure.

Governance Approaches, discussed most extensively in Chapter Three, assemble and enact ideas about health and the environment within formal organisations and structures and often define the environment and health as deeply interconnected. However, the principles they engender are not always easily translated (often from the

international sphere) through national, regional and local structures in ways that translate holistic insights into local practices. Examples cited in Chapter Three included the 'Health for All' Alma Ata Declaration initiatives, the Environmental Health Action Plans (NEHAP), and the Children's Environment and Health Action Plan for Europe (CEHAPE).

Purist Approaches are single discipline approaches and remain as such even if interdisciplinary or interagency collaborations are occurring. They could be best seen at work in the journal content analysis in Chapter Four and in some of the stakeholder discourses presented in Chapters Five and Six. The key characteristic of this approach is that reified notions of the environment help to shore up disciplinary frameworks and projects. Therefore, while they may appear to be destabilising as they can challenge traditional disciplinary orientations and even help a discipline expand its jurisdiction (sometimes referred to as contemporising it), these movements do not call into question the theories or methods that underpin the discipline's specific logos, tools or arenas of expertise. Rethinking occurs without creating paradigmatic destabilisation but may generate innovate, and advance disciplinary, thinking.

Contextual Approaches are ontologically rather than epistemologically oriented. In both the theoretical as well as practitioner discourses discussed in this thesis, most people engaged in the project of rethinking the contexts within which they were working. Here the focus is not theoretical at the scale of disciplines but rather conceptual within applied contexts of using theory to shape action, as in the case of responding to a public health event. Examples of rethinking context come primarily from the journal analysis presented in Chapter Four, such as in the case of 'greening' the settings approach in order to develop an amplified view of the environment (Berger and Luckmann 1991; Hanlon and Carlisle 2010; Springett, Whitelaw and Dooris 2010) or expanding notions of health settings by looking at the natural and the social within the context of ecosystems (see Barton). Part of these initiatives could also be expanding social epidemiological definitions of health environments to consider with greater attention not only physical environments but natural ones.

Linking Approaches move a step further towards conceptual integration by actively bringing into conversation concepts, principles, and strategies from different disciplines but may not be formally recognised to be inter-, multi-, or transdisciplinary. Examples of linking approaches come primarily from the journal analysis in Chapter Four but are echoed throughout the interview data as well. The notion of a 'cross-cutting' issue is illustrative, as is the Health Field Concept or the Salutogenic view of health where various disciplines and policy arenas are brought together to work on health. Linking concepts are also exemplified by the BioPsychoSocial model used in social sciences studies of health or the EcoBioSocial model used in tropical diseases research by organisations such as the WHO. Linking approaches create hybrid concepts which can be powerful tools for creating novel combinations of concepts and tools opening up new possibilities for theory and practice. One thing they do not do is require a deeply integrationist normative worldview.

Connection Approaches are based on notions of interconnection and interdependence and think about the organism-environment as the basic unit of survival. Examples of connection approaches thinking include holism, Ecological Models of Health and Public Health, the Ecosystem Approach, Sustainability Science and Post-normal Science, and initiatives such as 'One World, One Health.' Connection approaches were most often invoked in interview. This suggests that in addition to being theoretically appealing they are practically useful, as the overarching operational view is that all things are connected and that health must be addressed within these extensive, systems based conceptualisations of causality.

Finally, *Systems Theory Approaches* are organised around thinking about systems as complex, multiple, dynamic assemblages. While social theorists tend to use systems theory to think about the social world, natural scientists use living systems theory to discuss the complexity of living networks of which humans are but one component. In my data, particularly in interviews with the international stakeholder group, systems thinking was often coupled with discussions about uncertainty and notions of consequence over time (generated in health studies by upstream thinking). The interaction between the material and ideological dimensions of an issue were also

brought into focus when people used systems theory to think through health and the environment, be it through elemental (air and water), contextual (the biosphere), interactional (humans as reliant on ecosystem services), or community relational (the social world as built in the midst of natural spaces and always impacted by the ways the natural world flows through social spaces) pathways.

The six conceptual approaches detailed here (and they are only one way of expressing the myriad frameworks used) summarise the key trends in making sense of health in the nexus between the social and the natural in social epidemiological approaches at present. What this thesis has also shown is that it is in moments when the health phenomena cannot be sufficiently understood or addressed within existing organisational or conceptual structures that theoretical, methodological and even policy change is catalysed. Repeatedly, elaboration on environmental frameworks using ecological principles occurred either in the pressured response oriented space of containing a health emergency and preventing its reoccurrence in the future, or in the theoretical space where the ecological approach to public health proved to be essential to making sense of the complex interplay between social and environmental health determinants producing contemporary health phenomena.

Bringing ecology to social epidemiology

Calling for a rethinking of the social within the context of social theory should extend to health research and, therefore, to a rethinking of the 'social' within social epidemiological studies of health, illness and disease. This research has shown how current constructions of natural environmental health drivers contour Public Health practice in the UK and how encountering the limits of existing structures ignites innovative responses which can generate new frameworks for health policy and practice. Overall, this thesis also argues that marginalisation of the environmental within the social sphere is facilitated by relations of power which produce a distorted notion of the autonomy of social communities from natural communities. Such a view does not move social theorising forward, particularly in relation to contemporary social issues which increasingly have an environmental component. One instance is contested environmental illnesses where the basic quality of air, potable water, and

the soil impact the kinds and levels of particulate and chemical contamination bodies are exposed to and required to process on a daily basis (Moss and Teghtsoonian 2008; Bendelow 2009). Until these environment-social interactions are better understood, these illness may be missed, misattributed, misdiagnosed and their environmental aetiology contested. It is difficult to ascertain the significance of these oversights as the degree of contestation over diagnosis, aetiology and the categories under which people are actually treated do not offer a data trail that enables an evaluation of the significance of the environment as a health determinant in these situations. A key contribution this thesis makes is to offer a body of conceptual and empirical findings on construction processes particularly within social contexts where considerable social capital is pooled and power is wielded, such as the medical system. A challenge for the future will be to find ways to disrupt these somewhat seamless processes in order to re-centre the environment—its processes, services, and systems—in the social sphere.

Pragmatically, however, this thesis poses questions it can only begin to answer. For example, a central idea in this study is that social studies of health can benefit from setting its aperture to the scale of studying health at the interplay between the environmental and the social. Within Public Health and Social Medicine, however, epidemiological frameworks such as environmental and ecological epidemiology already offer frameworks for working in the nexus between the social and the environmental and should not be disregarded but rather strengthened by shifts made in medical sociology. Social epidemiology (a place where medical sociology, public health and social medicine intersect) continues, however, to define the environment as a social milieu or as the built environment and leaves thinking about the natural environment to other frameworks. Yet, critiques of environmental epidemiology have also pointed to the fragmented representation of the natural world that can be generated in this framework through the use of existing datasets or by not systematically bringing the analysis of samples from the natural world (soil, air and water samples for example) into conversation with knowledge about the flow of systems and spaces, plus the complexity of pathways which link the social and the natural.

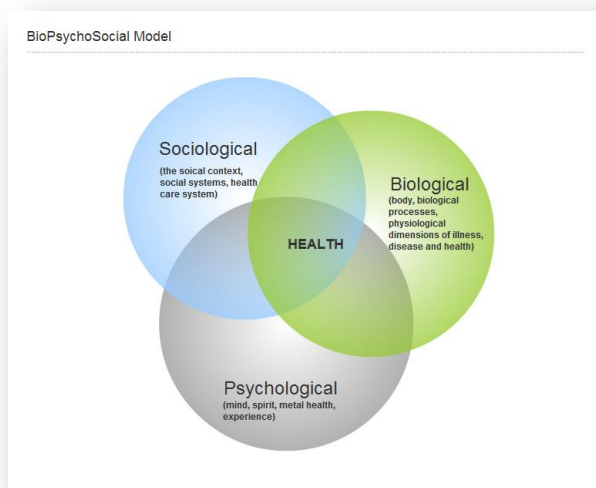
A question that arises from this thesis is whether ecological principles may go some distance to redressing these limitations because they draw attention to complexity, systems, interactionality, limits, tipping points, and communities. Conducting social epidemiological studies within 'bio-social milieux' would place health research in the interplay between human and non-human, biotic and abiotic communities. In this thesis I have considered different ways in which public health research, policy and practice are grappling with the links between human health and natural processes and draw attention to consensus science undertakings such as the Health Reports on Climate Change produced by the IHDP or the Millennium Ecosystem Assessment which makes explicit human reliance on ecosystem services. In both the theoretical literature and the interview data, there have been some who have called for linking ecological frameworks to public health. A contribution this thesis makes to these larger studies, many of them being developed within the health and natural sciences, is to think about whether this makes sense from a sociological vantage point. It is not until health is placed at the centre of the inquiry that it makes sense to me as a sociologist to shift the focus on the social to the ecological. It seems, therefore, that health studies stand at the vanguard of the movement to rethink the social and that social epidemiology faces a challenging future, as do the social sciences more generally. The challenge is to produce analyses of the social world which are specialised and expertly nuanced while defining the 'social' in realist ways, using concepts, language and techniques which leave behind 'purification' practices and embrace the complexity of human existence and human survival on planet Earth.

The EcoBioPsychoSocial Model

Conceptual frameworks are brought to life through conceptual tools. As rehearsed in Chapter Six, the models of health determinants in current use show a growing appreciation that 'general socio-economic, cultural and environmental conditions' (Dahlgren and Whitehead 1991) are a sphere of influence that exists within a larger sphere of importance, namely the biosphere. Barton's (2005) health map placed 'the determinants of health and wellbeing in human habitation' within the meta-context of the 'global ecosystem'. This expanded approach, however, leaves the identification of

relevant social and environmental determinants of wellbeing to public health theory and epidemiological practice, which means that the operationalisation of the biosphere occurs within a highly social framework void of ecological principles to guide thinking about the interface between human and environmental processes and their relevance to human health. In the face of studies of environmentally-driven health injuries, when the environment is seen as separate from the social and vice versa, the health determinants model is conceptually useful but methodologically lacking.

Looking elsewhere within social studies of medicine for ways of studying the interplay between health determinants, the BioPsychoSocial (BPS) model for health research is instructive as it treats the biological (body), psychological (mind), and sociological (the social) as interlocking systems of the body. Georg Engel, who introduced the concept, writes:

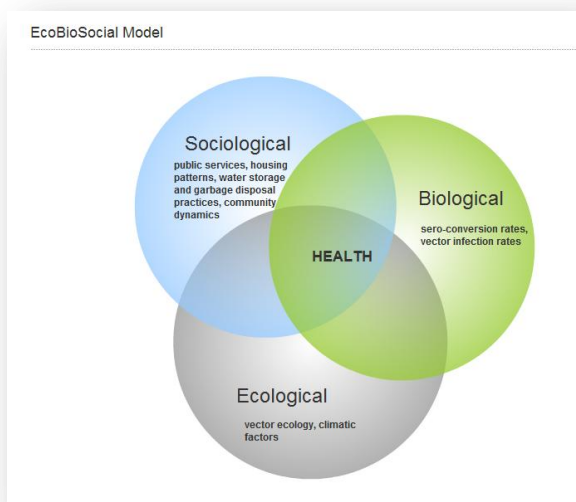


To provide a basis for understanding the determinants of disease and arriving at rational treatments and patterns of health care, a medical model must also take into account the patient, the social context in which he lives and the complementary system devised by society to deal with the disruptive effects of illness, that is, the physician role and the health care system. This requires a biopsychosocial model. (Engel 1977)

Figure 17. The BioPsychoSocial Model

At the centre of this model is an awareness of the health impacts of the relationship between the individual and her/his environment (Adler 2009). The focus is not on disease but on health and wellbeing and the method of analysis is more holistic than the biomedical model, treating psychosocial factors as health determinants. The BioPsychoSocial model has been particularly useful for studies of mental and emotional health conducted through the mind-body connection and for research on

contested illness which is informed by theories of embodiment and lived experience. What is missing from this conception of health and illness, however, is a notion of context that reaches beyond the social environment. Many contemporary health issues are showing that environmental, animal and ecosystem health directly impact human health and that injuries to human health occur through these cycles (i.e. the food industry, antibiotics and the fostering of novel strains of common disease such as influenza).



The EcoBioSocial (EBS) framework (TDR 2011) complexifies the analysis of context through its focus on the genesis of infectious diseases which include not only health inequalities emanating from the social world but also ecological considerations which have direct impacts on organismic activity, as

Figure 18. The EcoBioSocial Framework

infectious disease emergences attest. Studying the multifactorial dimensions of disease and their geneses places the study of health at the interface between humans, animals (which includes pathogens) and environments. Moving back and forth between the social and the natural world, issues of gender, transdisciplinarity and community engagement are portals through which researchers enter into the study of health issues in a particular place and space. Insight into the human subject, including the subjective experience of illness and how sense making is part of the illness and healing process for humans on a personal level, and the role of ideology in shaping the social practices which are behind much human destruction are not, however, part of this model.

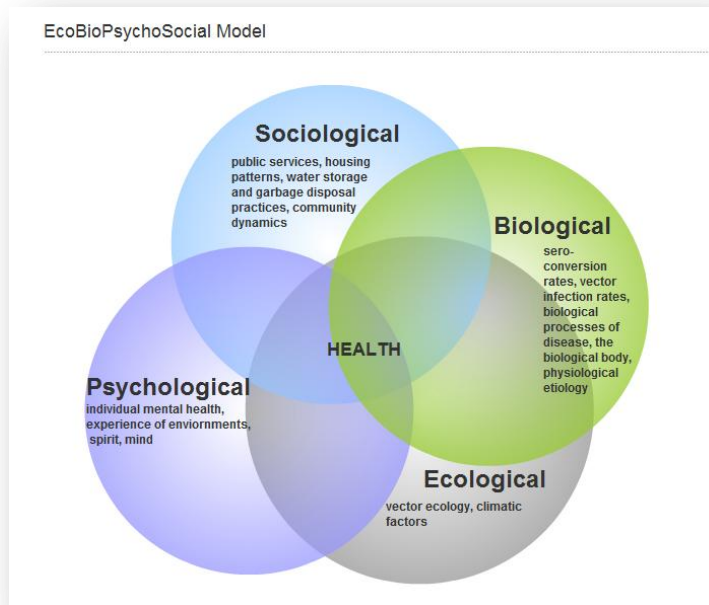


Figure 19. The EcoBioPsychoSocial Model

The EcoBioPsychoSocial model is an assemblage of the two previous models discussed. The value of bringing these two models into conversation is that it offers a framework for considering not only the mind-body dimension of health and wellbeing and the processes and contexts through which illness and disease states are produced (and reproduced) but also what the impacts of the interplay between social and ecological processes are on health and illness processes. Through this framework understanding the relationship between inequity in the social world and ecosystem degradation in the natural world, for example, become important considerations. What these linking actions can also do is help elaborate upon discourses on health determinants through giving careful consideration to the assemblage of multiple social and natural health drivers at work in an illness event. Finally, it can help cultivate an appreciation of the element of change over time as it is through an iterative process that the relationship between the social and the natural interplay to eventually produce the conditions that produce an environmentally driven health injury.

Methodological Contributions

Critical poststructural approach to social construction

In this thesis I have used a range of theories. This study is an example of how social constructionist studies of health and disease can use poststructural theories, and in particular theories of power, to draw attention to how power, knowledge and discourse shape material practices which include public health activities intended to produce healthy people and healthy environments and ideas about the interplay between public health and the integrity of the natural environment. . In the case of discursive institutionalism, they include a method for analysing how discourses become socially constituted through a variety of spaces and practices, highlighting the importance of conceptual precision when producing discourses in original research contexts that will then be circulated through knowledge management strategies, such as policy formation, in the wider social world.

Another way critical theoretical approaches have strengthened social constructionism, as it has been practised in this thesis, is by placing discourse-based meaning-making and phenomenon-building activities within the context of the material world. Within this contextual framework, the limits and boundaries of social theory encountered when trying to engage with the complexity of the biological (including non-human bodies and contexts such as ecosystems) and the natural environment (including ecological processes) become increasingly evident. In response to these limitations, this thesis has focused on the generativity of moments when environmental health issues have been read through the lens of relations of power and discourse, when the materiality of biological and environmental contexts and processes has challenged an exclusionary focus on the social, and when the lived reality of environmentally driven health injuries are read against the inadequate systematic public health response to them. This research has sought to address this disjuncture by investigating what practitioners are doing when faced with the seriousness of environmentally and ecologically driven health injuries which are becoming more crucial to contemporary public health. The pursuit of these questions has been facilitated by placing concepts of power at the centre of the social construction framework.

Conferences as a site for field research

As described in Chapter Two, a small but growing arena of methodological innovation is using conferences as a site for field research and it is to this small but growing project that this thesis contributes. As Knorr-Cetina has suggested, conferences create “a grid of discourse spaces for experimental coordination and integration ... yet remain understudied as mechanisms and venues in organization science and companion disciplines in the study of organizations” (Knorr-Cetina 1995). To this work my research contributes reflections on three aspects of using conferences: conferences as a site of networking and community building; conferences as a site of intensive participant recruitment, especially when building a broad spectrum research population; and conferences as a site of learning, idea testing and theory building.

Overall, using conferences as field study sites enabled me to interview a wide range of people and in particular to include in my research population people from the outlying demographics of a population, in particular the elites and the entry level, early career workers. Interviewing elites, sometimes referred to as ‘studying up’ was facilitated because of not having to negotiate with the gatekeepers classically encountered when interviewing this population. In the case of the UK public health community, conferences like the annual HPA general conference or the annual UK PHA conference attracted a wide range of attendees. For example, at the HPA annual conferences, I was able to interview regional directors, laboratory managers and division leads through to people working in the communications department, laboratory technicians and GIS programmers who were displaying some of the latest technology the agency is commissioning. Correspondingly, in international conference settings, while my access to a wide range of delegates was not always assured (unless there was a particular funding scheme for community partners for example), I was able to access elites who in the case of my research were lead scientists for organizations such as the WHO, IHDP, UNESCO and various United Nations programmes.

In addition, through conferences I was exposed to cutting edge research in the areas pertaining to my study. I also participated in specialist international workshops and

working groups and was able to interview paper presenters on their research long before they have published their work in academic milieux and much longer before this knowledge enters academic discourses. Personally, I was also able to build professional networks with people working specifically in my area of interest and have as a result established myself in international communities. For example I have become the student chair for the International Association for Ecology and Health. These opportunities have brought me close to the areas of innovation occurring in this new field of health research. A conclusion of this doctoral study, therefore, is that there are many benefits to interdisciplinary projects working at the forefront of a discipline to use conferences as a site of field research and at the same time as a context of learning.

Knowledge translation across discourses

Translational research (Woolf 2008) within the health sciences highlights that such activities are useful for linking projects of basic and applied research but also for trying to close cultural and discursive distances between the various scientific fields. Translating discourses across the disciplines of sociology, public health and natural sciences for the purpose of theoretical learning is a methodological contribution of this thesis. The diverse ways in which the environment is used within each discipline means that when used as a concept to facilitate cross-disciplinary conversation and collaboration the concept of the environment can confound the interdisciplinary spirit. This variance in definitions and in areas of focus points to the importance of developing an interdisciplinary awareness of concepts, insight into the vernacular of disciplines, and an appreciation of the models, methods and technologies used within each discipline, including of their strengths and limitations.

The interdisciplinary reach of this research also draws attention to tensions that arise when working across the medical, natural and social sciences. How to consider multiple scales, accommodate the different motivations for conducting research, find a balance between problem solving and theory building and develop skills in using a variety of tools and technologies to gather data are all ways in which to redress these

tensions. Developing research that satisfies the reward structures and professional promotion pathways within each discipline is also important as is recognising that there are varying degrees of professional supports for interdisciplinary research collaborations.

In light of these observations, one tool I have used is the notion of disciplines as institutions, defined here as conventions, norms or formally sanctioned rules which coordinate action (Vatn 2005). Recently, two colleagues (Castán Broto, Gislason and Ehlers 2009) and I proposed that disciplines function as, and through, institutions in the context of sustainability research; however, in my doctoral research I also found this to be true in health research. This approach complements the basic social constructionist view that social phenomena are constructed by pointing to how disciplinary activity significantly contours the construction process as well as critical theoretical insights. It pinpoints general ideas about how power is exercised through technologies and techniques of power (Foucault 1995) within specific theories, methods and relationships between disciplines, such as at the interface between the social and natural sciences which is itself organised through discourses such as ‘hard and soft’ science.

Empirical Contributions

Upstream approaches to public health practice

The place of the precautionary principle and resilience thinking within health research, policy and practice has been raised in this thesis, both in the literature and in interviews with public health practitioners. Taking upstream approaches to public health was most often exemplified within ecologically informed health approaches. Using complexity theory to unpack why upstream thinking is not being adopted in the public health sector—at least as widely as it might be given the significance of the environmentally driven health problems that public health faces—has been a focus of this research. Precaution and attention to building resilience in human and natural systems seems one possible way to engage in health promotion and health prevention at the scale of populations, or so the research in this thesis suggests.

The interview data in particular show that typically only extreme natural events, such as natural 'disasters' (with flooding and heat waves being the primary ones in the UK) place the natural environment centrally on the public health radar. The literature has also shown that the turn to the natural environment is not driven by a conceptual linking of environmental resilience with human health promotion (such as post-traumatic stress disorder (PTSD) due to extreme and sometimes repeated flooding events) but to the issues that grab the public's attention and the focus of financial, political and health sectors (for example as a result of mounting insurance payments or days lost to illness at work).

Drawing on a four tier health prevention model may help reconcile clinical practice frameworks with the prevention and health promotion mandates of public health. Primary prevention includes health promotion and requires action on the determinants of health to prevent disease occurring. It has been described as refocusing upstream to stop people falling in to the waters of disease (e.g., most population-based health promotion activities). Secondary prevention is essentially the early detection of disease, followed by appropriate intervention, such as health promotion or treatment. It has the goal of preventing the progression of the disease and emergence of symptoms. Tertiary prevention aims to reduce the impact of the disease and promote quality of life through active rehabilitation by restoring function and reducing disease-related complications (Barlow, Trimcev and O'Sullivan 2010). As Butler has suggested in relation to understanding the health consequences of climate change:

The primary health impacts include heat prostration from heat waves, injuries after floods or fires, and the consequences of public infrastructure collapse; secondary consequences are vector-borne diseases, food and water-borne infections, and allergies that would result from ecological and environmental changes; and the tertiary consequences would be famine, local and regional conflicts, displacement, refugees, and developmental failure [with] tertiary consequences causing the greatest health impacts in this century. (Butler in Lidegaard and Ricketts 2009, p. 3)

In that preventative medicine is geared toward preventing existing diseases in people instead of searching for the overall cure it is valuable to add another phase:

Quaternary prevention—health activities that mitigate or avoid the consequences of unnecessary or excessive interventions in the health system—such as ecological thinking, building carbon neutral futures and so on (Barlow, Trimcev and O'Sullivan 2010).

As a beginning, when studying health impacts in this way, sociological research could consider the natural, built, and social environments at the individual, community, regional, and national levels, and think more about scale (both time and space) and in terms of relationships and not just data points. Issues of proportion could also be revisited so that ratios and not just absolute values matter. Rethinking issues of context, a refrain in this thesis, will also help thinking about issues of diversity, justice, fairness and the distribution of benefits and risks—all issues that will need to be addressed in relation to health-social-environmental interfaces if initiatives such as the Millennium Development Goals are actually going to be realised. Of course, all of this movement upstream has the benefit not only of creating health interventions that help to build natural environmental resilience but also of generating contemporary public health interventions, whether conducted within organisations such as the HPA or the UKPHA, that will benefit future generations (Barlow, Trimcev and O'Sullivan 2010). The formulaic suggestions offered here are also intended to move thinking upstream, particularly in medical sociology.

Invisible obstacles to policy uptake

Invisible forces impeding the uptake of prevention-oriented environmental health policies can be identified when reading the interview data alongside the analysis of the environmental health policy arena conducted using the Policy Arrangement Approach (PAA) discussed in Chapter Three (Leroy and Arts 2006; Crabbé and Leroy 2008). Actors and coalitions, the allocation of resources and power, the norms, conventions and rules of the game and the ways in which discourses constitute the social all play a role in shaping ideas about environmental health. These discourses find expression in the governance arena which enters into the public health sector as formal policies and mandates. However, the four dimensions of the policy arrangement approach also work in informal ways, such as through public health norms and conventions (Vatn, 2005) at the scale of public health as a discipline as well as in more localised ways

within the culture of specific public health agencies. One area where this is particularly relevant is in how individual public health practitioners influence how environmental health determinants are defined and put to work within a public health sector that often lacks formal mandates, procedures and structures for dealing with the environmental determinants of health injuries, which was discussed at length in Chapters Five and Six.

There are specific aspects of public health culture that are particularly illustrative: the norms and conventions of what constitutes best practice; what is reasonable to expect of people given workloads; and what is a traditional public health issue or approach. In some cases it may be practitioners are not aware of environmental policies, mandates, methods or frameworks for linking the natural environment to public health and in other cases it may be dubiety about the relevance of the natural environment to health. Where there is an awareness of existing policies, another issue which inhibits policy uptake is that they tend not to be multisectoral in focus and do not help to integrate environmental or ecological policies within health governance initiatives. Even an increase in interagency collaborations is not completely shifting these trends, as the collaborations are incident led rather than reflective of an overall shift in ideology.

A more ubiquitous problem is that policies tend not to be synced up with resource allocations, so there can be the vision and political intent but no ring-fenced resources to help translate policy innovation into practice. Particularly in Chapter Seven, research participants spoke about the importance of accessing funding to transform practice and the frustrating but defining role funding plays in innovation within public health culture. It is not surprising, therefore, that there are seemingly covert and underground environmental health movements occurring within public health organisations which operate without funds, status or supporting protocols. Backing is not given for a variety of reasons including the marginalisation of the subject, the ways in which existing relations of power and organisational structures are designed.

A final obstacle raised in this thesis is that government, as opposed to the health or science communities, sets much of the public health agenda. As shown in Chapter Six, in cases where the environment falls under the remit of public health 'research,' funding is often linked to a particular policy formation project. Therefore, the way research initiatives are approached in this arena shapes how the environment is addressed; in turn resource allocations, policy timeframes and policy agendas contour research agendas. This is not always sinister, but it perhaps overemphasises the role of certain stakeholders and agendas in the knowledge making process. Some of the key drivers in the environmental world are therefore not being studied and brought into formal discourses, a trend which has far reaching implications for policy and practice.

In a nation where it often takes a crisis to bring the environment to the forefront of health research initiatives and where infrastructure and resources are still ample enough to keep the environmental contained through infrastructure, it could take a natural disaster of calamitous proportions to supersede the invisible institutional forces at work in the public health sector. If future predictions are correct the might of the technological or the social will not necessarily be able to always keep the environment at bay, particularly as instability, chaos and interactionality become more characteristic of environmental health drivers. Given the formula of calamity as rationale for paying attention, this could mean that in the future, the public health system will not have accrued significant theoretical, conceptual, methodological, infrastructural or economic capacities to mount the required responses. Insight, prevention, and forward thinking, consequently, are some of the most powerful public health tools that exist, and, unfortunately, they are presently often dismissed within the public health sector in favour of addressing the emergencies of the day.

To positively impact the uptake of environmental public health policies and mandates, one key site of change, this thesis argues, will have to be public health institutions, as it is through informal pathways that much of the construction of the relevance of the environment to population health occurs. Activity at the scale of the individual practitioner which generates a personal recognition of the relevance of the links between health and the natural environment as it relates generally to population health and specifically to their remit will be an important intervention. Also valuable

will be initiatives that imbue practitioners with a sense of being oriented within the issues, and confident in the value of, tackling environmental health drivers as they come across their desk and are encountered in the field.

Future Research Directions

I have often found myself to be the only sociologist, and beyond that the only qualitative researcher, working within many ecological health settings. In these arenas I have had to establish my credentials as an 'ecologically literate' social scientist. I have also had the opportunity to introduce critical social theory and methodologies to natural and health scientists and to outline the potential contribution qualitative theories and methods could make to human and animal medicine initiatives. One of my future jobs is to open up spaces in sociology where parallel dialogues are desired, supported and participated in and where sociology can make important contributions to interdisciplinary dialogues in areas in public health and human medicine as well as in the natural sciences. These interdisciplinary dialogues will be important for the future, not only in terms of health but also in terms of areas where environment and health initiatives intersect with other arenas such as community development. Overall, these aspirations can be read as aspects of the task of furthering interdisciplinary health research and focusing in particular on the contributions qualitative sociological health research can make to studying and responding to health issues as they are conceptualised in the nexus between social and environmental drivers.

There are many literatures with which my research is in conversation but which have not been explicitly discussed in this research. An extension of my current work on health and the environment will be to explicitly address myself to texts organised around post-human ontological and epistemological approaches to the social sciences. Specifically, I am referring to work occurring in the post-humanities and feminist philosophy on the natural world, the social world and human-animal relationships (Wolfe 2003; von Uexküll 2010; Wolfe 2010). In sociology, initiatives speaking to such issues include existing work on turns to biology (Williams, Birke and Bendelow 2003) and the body (Williams and Bendelow 1998b; Bendelow 2009), and social theoretical

work on the sociology of disease (Timmermans and Haas 2008). There is also newly published work on the interactions between humans and nature warranting attention (Willis 2009; Clark 2011), including calls to consider micro-ontologies and the importance of the microbial world to the social world as well as to health (Bateson 2000; Hird 2009). One of the issues within the literature identified above, however, is that health as a normative concept is not always considered as central and for this reason I will need to address how to use this work to think through illness and suffering as well as health and wellbeing in theoretical as well as in materially grounded ways. Resilience thinking, the precautionary principle and social justice as related to health and illness are areas where the theoretical frameworks above can be grounded in the challenges of everyday realities where issues of health and disease are produced, and improved through new ways of understanding the interrelationship between the natural and social world. Above all, this project is about the interconnection between humans and the social and natural worlds which make up our contemporary living environments. It is also about building a deep and considered sociological understanding of the basic unit of survival which is at root organism *and* environment.

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Appendices

Appendix One: Overview of Research Population Assembled

Research Participants Demographic Overview by Stakeholder Group						
Group	Education	Employer	Job	Career Stage	Gender	Country
HPA	PhD	Health Protection Agency	Consultant	Mid-Career	Male	Great Britain
HPA	PhD	Health Protection Agency	Director	Mid-Career	Female	Great Britain
HPA	PhD	Health Protection Agency	Director	Mid-Career	Male	Great Britain
HPA	PhD	Health Protection Agency	Director	Mid-Career	Male	Great Britain
HPA	MD	Health Protection Agency	Consultant	Late Career	Male	Great Britain
HPA	PhD	University of East Anglia	Lecturer	Mid-Career	Male	Great Britain
HPA	BA	Health Protection Agency	Technician	Early Career	Male	Great Britain
HPA	BA	Health Protection Agency	Technician	Early Career	Male	Great Britain
HPA	MA	Health Protection Agency	Consultant	Early Career	Male	Great Britain
HPA	PhD	Newcastle General Hospital	Manager	Late Career	Male	Great Britain
HPA	MA	Health Protection Agency	Technician	Early Career	Male	Great Britain
HPA	PhD	West of Scotland Specialist Centre	Medical Director	Mid-Career	Male	Great Britain
HPA	PhD	Hospital	Scientist	Mid-Career	Male	Great Britain
HPA	PhD	Health Protection Agency	Regional Microbiologist	Late Career	Male	Great Britain
HPA	MD	Health Protection Agency	Physician	Early Career	Male	Great Britain
HPA	Nurse	Health Protection Agency	Nurse Consultant	Mid-Career	Female	Great Britain
HPA	PhD	Health Protection Agency	Consultant	Late Career	Male	Great Britain
HPA	MA	Environment Protection Agency	Consultant	Mid-Career	Male	Great Britain
HPA	PhD	Health Protection Agency	Regional Director	Mid-Career	Male	Great Britain
HPA	PhD	Health Protection Agency	Local and Regional Services Lead	Mid-Career	Male	Great Britain
HPA	PhD	Liverpool John Moores University	Researcher	Early Career	Male	Great Britain
HPA	MA	Health Protection Agency	Scientist	Mid-Career	Female	Great Britain

HPA	MA	Health Protection Agency	Scientist	Early Career	Female	Great Britain
HPA	PhD	Health Protection Agency	Scientist	Late Career	Male	Great Britain
HPA	BA	Health Protection Agency	Scientist	Early Career	Male	Great Britain
HPA	BA	Health Protection Agency	Coordinator	Mid-Career	Male	Great Britain
UK PH	MA	London School of Hygiene and Tropical Medicine	Lecturer	Mid-Career	Female	Great Britain
UK PH	PhD	London School of Hygiene and Tropical Medicine	Reader	Late Career	Male	Great Britain
UK PH	PhD	University of the West of England/WHO Collaborating Centre	Reader	Late Career	Male	Great Britain
UK PH	MD	Natural England	Strategic Health Advisor/MD	Mid-Career	Male	Great Britain
UK PH	PhD	University of East Anglia	Senior Research Fellow	Mid-Career	Male	Great Britain
UK PH	MA	Brunel University	Lecturer	Mid-Career	Female	Great Britain
UK PH	MA	Fuel Poverty Initiative	Project Group Manager	Mid-Career	Female	Great Britain
UK PH	PhD	City University London	Professor	Late Career	Male	Great Britain
UK PH	PhD	University of Plymouth	Lecturer	Mid-Career	Male	Great Britain
UK PH	PhD	York St. John University	Reader	Mid-Career	Female	Great Britain
UK PH	PhD	Brunel University	Professor	Late Career	Male	Great Britain
UK PH	MA	Oxford University	PhD Student	Early Career	Male	Great Britain
UK PH	PhD	Private Consulting Firm	Consultant	Mid-Career	Female	Great Britain
UK PHA	PhD	University of Glasgow	Research Fellow	Mid-Career	Female	Great Britain
UK PHA	PhD	Liverpool John Moores University	Head of Development	Mid-Career	Female	Great Britain
International	PhD	Public Health Agency of Canada	Director	Mid-Career	Male	Canada
International	PhD	Consortium for Conservation Medicine	Director	Mid-Career	Male	United States

International	PhD	United States Environmental Protection Association	Scientist	Mid-Career	Female	United States
International	PhD	Consortium for Conservation Medicine	Executive Director	Mid-Career	Male	United States
International	PhD	World Health Organisation	Director	Late Career	Male	Netherlands
International	MD	Harvard Medical School	MD/Research Associate	Mid-Career	Male	United States
International	PhD	World Health Organisation/TDR	Technical Officer	Mid-Career	Male	Switzerland
International	PhD	United Nations	Senior UN System Coordinator	Late Career	Male	United States
International	PhD	University of Madison	Director	Mid-Career	Male	United States
International	PhD	Private International Corporation	Consultant	Mid-Career	Female	United States
International	PhD	International Human Dimensions Programme on Global Environmental Change	Academic Officer	Early Career	Male	Germany
International	PhD	Center for International Forestry Research	Researcher	Mid-Career	Female	Indonesia
International	PhD	University of Denmark	Head of Centre	Late Career	Male	Denmark
International	PhD	World Health Organisation	Senior Scientist	Mid-Career	Male	Switzerland
International	PhD	Biodiversity International	Director General	Mid-Career	Male	Italy
International	PhD	Penn State University	Associate Professor	Mid-Career	Male	United States
International	PhD	US Centres for Disease Control and Prevention	Branch Chief	Mid-Career	Female	United States
International	PhD	Wildlife Conservation Society	Assistant Director	Early Career	Female	United States
International	PhD	Finnish Forest Research Institute	Professor	Mid-Career	Male	Finland

Appendix Two: Field Research at Academic Conferences

Conferences as Sites for Field Research				
Conference	Conference Mandate	Research Rationale	Contribution to Research	Interviews
The Annual Health Protection Conference of the Health Protection Agency of the UK, 2007 - Coventry, UK	The HPA's annual conference is a leading event for those involved in Public Health and with the topics under the spotlight at this year's event, 2007 promises to continue to provide a valuable experience and contribution to public health professionals.	To test idea of conferences as field site, to test project framing and research questions, to familiarise myself with UK public health system.	Ad hoc approach, recruitment <i>per se</i> was not goal driven; rather the focus was on concept and method evaluation.	None – although contacts established for future interviews and enabled me to work effectively at the next HPA annual conference.
The Asia Pacific EcoHealth Conference: Ecology and Health: People and Places in a Changing World – 30 November – 3 December, 2007, Melbourne, Australia, 2007.	This conference plans to build on and further explore some of the key issues surrounding the interdependent relationships of humans and their environments. Unsustainable living, climate change and disassociation from nature are beginning to take their toll and will create disastrous repercussions for human health and survival if they are not addressed in the near future.	To see what the newly emerging discipline of EcoHealth could teach me about my interest in ecology and health. Received funding from the FSHI to attend.	Learned about the EcoHealth approach. Wrote a paper on sociological literacy of ecology and tested the interdisciplinary interface between science, medicine and sociology through that presentation. Became involved in the student section of the IAEH. Began building an international professional network.	None – although contacts established for future interviews. I also clarified my research focus at the end of this conference.
COHAB 2 - Second International Conference on Health and Biodiversity, Cooperation on Health and Biodiversity, 25-28	The conference will explore strategic practical methods for integrating biodiversity into local, national and international programmes on health and development, including national climate change strategies and action plans towards the U.N.	To begin to recruit participants and gather interview data. Many elites were invited to this conference as it was an intensive working and policy forming event.	Pre-contacted the organisers and, with their help, identified perspective research participants, some of whom I had just met in Australia. This was an intensive learning	I secured 14 interviews, conducting 13 at the conference and 1 as a telephone interview following the meeting.

Galway, Ireland.	Millennium Development Goals. Discussions will also investigate the health and social aspects of nature conservation strategies, with the aim of promoting cross-sectoral understanding and partnerships for truly sustainable development.		experience for all involved and for me was a weeklong intensive study of health, ecology and biodiversity as related to infectious disease emergences.	
The Fifth United Nations Day of Vesak (UNDV): "Buddhist Contribution to Building an Equitable, Democratic and Civil Society", 13-17 May, 2008 Hanoi, Vietnam.	<p>Main Theme: Buddhist Contribution to building a Just, Democratic and Civil Society. Sub Themes include:</p> <p>War, Conflict and Healing: A Buddhist Perspective; Buddhist Contribution to Social Justice; Engaged Buddhism and Development; Care for Our Environment: Buddhist Response to Climate Change; Family Problems and the Buddhist Response; Symposium on Buddhist Education: Continuity and Progress; Symposium on Buddhism in the Digital Age</p>	To deepen my connection with the scholars working on ecology, health and ethics. Was invited to present and funded by UNESCO.	Deepened my contacts with IAEH International Board members through this conference which led later to participants gathered through snowball and opportunistic sampling opportunities. I also presented alongside some of the leading public health and climate change scholars and had a week to discuss my research with them.	None – although contacts established for future interviews
The Annual Health Protection Conference of the Health Protection Agency of the UK (HPA 2008), Coventry, UK.	The HPA's annual conference is a leading event for those involved in Public Health and with the topics under the spotlight at this year's event, 2008 promises to continue to provide a valuable experience and contribution to public health professionals.	To recruit participants and gather interview data.	To all the people whose paper or poster abstracts indicated research on health and the environment I emailed an invitation to participate in my study with the goal of speaking to people in the HPA who were already thinking about these issues.	I contacted 42 people and secured 26 interviews. I conducted 17 during the conference. I conducted telephone interviews with 6 people after the conference and 3 answered my interview questions by email. I treated these as survey results.

Society for Social Medicine 52nd Annual Scientific Meeting. University of Southampton , 17-19 September 2008.	<p>For many of us the Annual Scientific Meeting is one of the highlights of the academic year - a conference where the best methodology is coupled with the latest health services and public health research in a friendly atmosphere, with great social occasions.</p>	<p>To recruit and gather data from public health workers outside of the HPA.</p>	<p>Attending the conference itself was educational and taught me about the various frameworks shaping environment and health discourse even under the common rubric of critical scholarship, social medicine and the environment and health. After this conference added the Social Medicine journal to my research as I felt this is an important dimension of the conversation about social epidemiological studies of health and illness.</p>	<p>Of the 5 people I approached for interview at the conference, 4 declined and 1 I met with personally after the conference but afterwards he felt his subject area was not close enough to my research question. He put me in contact with colleagues.</p>
Second Biennial International EcoHealth Forum 2008, Merida, Mexico	<p>This conference will focus on renewing and establishing networks to further the capacity of participants to promote healthy ecosystems and, in turn, healthy people. Conference participants – researchers, policy-makers and practitioners – will learn how project outcomes have been used by other policy-makers, stakeholders and community representatives to effect improvements in ecosystem management, disease prevention and environmental protection. Experiences with research and practice, including methodological gaps and opportunities for intervention and policy development will be</p>	<p>To return to purposefully recruit and gather data to enhance my international stakeholder group. Again, I was funded by the FSHI to attend.</p>	<p>At this conference I was able to evaluate how discourses, theories and methods have been developing in this arena and what cutting edge research is predicting as well as to hear about participant's personal experiences, including frustrations of working at this frontier. This is anecdotal evidence that is not formally in my thesis but offered a litmus test for my research. I also participated in a specialist</p>	<p>Secured interviews with 3 people at this conference and conducted interviews with 1 during the conference and 2 by telephone within a few months of the conference end.</p>

	presented.		international working group day long workshop on ecology and infectious diseases to continue that learning process. Finally, I presented my initial findings of my research and discussed/reflected on it through people's responses.	
17th Annual Public Health Forum, 17th Annual UKPHA Conference 'Health inequalities - turning the tide?', Brighton, 2009	<p>Key Themes:</p> <ul style="list-style-type: none"> • Tackling Health Inequalities • Public Health, Sustainable Development and Climate Change • Housing and Health • Transport and Health • Commissioning to reduce Inequalities 	To recruit and gather data from public health practitioners working in the UK public health sector (and outside of the HPA).	I contacted the Health and Sustainable Environments Special Interest group and in advance of the forum the 2 leads of this group put me in touch with members of the group and generally facilitated my recruitment.	I interviewed 2 people from this group before the conference and of the additional 17 people I contacted, I secured interviews with 5 of them in total. I interviewed 3 during the conference and 2 via telephone interviews post conference. Through snowball sampling I made another set of contacts of which 5 lead to interviews with people affiliated with the UKPHA but who were not at the conference.
Third Biennial International EcoHealth Conference, August 18-20, 2010 London, UK	The main themes of the conference reflect our title: Global Ecohealth Challenges; Multiple Perspectives. The goal of the conference is to discuss critical and	To review the primary discourses, theories and methods in circulation. To reflect on the composition of my	Established my sense of connection to this ecology and health research community and moved forward	No interviews were conducted as a result of this conference.

	<p>timely issues – both contributing to important international policy decisions and profiling important themes for science and policy. Our goal will be to bring together multiple perspectives on the critical Ecohealth challenges of our time.</p>	<p>international stakeholder group and recruit if necessary and to present my findings on the environment and public health policy in the UK and to run a workshop on the future contributions of the arts and humanities to science as part of a larger project to develop interdisciplinary dialogue in health research.</p>	<p>some thinking on interdisciplinarity and the place of the social sciences in newly emerging disciplines and methods that are being developed within biomedical cosmologies. Confirmed the importance of bringing social theoretical insights to these very applied undertakings and to thinking about the social as opposed to being confined by the ‘sociological’ when working in interdisciplinary spaces.</p>	
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Appendix Three: Interview Package

INFORMATION SHEET & CONSENT FORM

Study Title:

HEALTH AND THE ENVIRONMENT:

A CRITICAL ENQUIRY OF THE CONSTRUCTION AND CONTESTATION OF ECOLOGICAL HEALTH

You are being invited to take part in a research study. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask me if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. You will be able to keep this sheet and a signed informed consent form. *Thank you for reading this.*

The purpose of this study is to research what kinds of ecosystem based approaches to health are being developed within integrated or environmental public health responses to climate change. Specifically, this study looks broadly at how the complex relationships between the social, ecological, environmental, economic, political and cultural determinants of health are being constructed and contested within environmental public health policy and practice development processes. Within this broad arena, a particular focus will be placed on integrated public health responses to climate driven arthropod borne infectious disease emergences and how the causal relationships between sociologic, epidemiologic, ecologic, and economic activities being constructed and contested within environmental public health textual and practical responses to insect borne disease emergences and re-emergences.

If you agree to be interviewed this will involve an interview lasting between 20 minutes and an hour (depending upon how much time you can spare). If you agree, I will tape-record the interview to aid recall (though you are free to request me to stop recording at any time). I will remove all personal identifiers from the tapes to anonymise them.

The interviews will be transcribed and I will use them as the basis for my doctoral research and potentially for academic articles and a report for policy makers. These publications will be sent to you so that you can check that where you are quoted, it is a) accurate, and b) anonymous.

At the end of the project, the anonymised transcripts of the interviews will be stored in a locked storage facility. The tapes will be destroyed according to the British Sociological Association protocol.

All information collected during the course of the research will be kept strictly confidential. Any information about you which leaves the interview site will have your name and address removed. Tapes of interviews will be kept under lock and key, according to the Data Protection Act. Although it is not always possible to ensure that people are never identifiable by their statements, all published material will be anonymised and referred to by code, and all efforts to ensure anonymity will be made.

This research is being funded by The Commonwealth Scholarship and Fellowship Plan and the Social Sciences and Humanities Research Council of Canada.



Department of Sociology

School of Social Sciences and Cultural Studies

University of Sussex
Falmer, Brighton BN1 9SN

Telephone: 07890 5944446
M.K.Gislason@sussex.ac.uk

CONSENT FORM

Title of Project:

HEALTH AND THE ENVIRONMENT:

A CRITICAL ENQUIRY OF THE CONSTRUCTION AND CONTESTATION OF ECOLOGICAL HEALTH

Name of Researcher: Maya K. Gislason

Please initial box

1. I confirm that I have read and understand the information sheet dated February 2008 for the above study and have had the opportunity to ask questions.
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my legal rights being affected.
3. I give permission for this interview to be tape recorded
4. I acknowledge that anonymised extracts of my interview might be used in academic and other publications

☐
☐
☐
☐

I agree to take part in the above study:

Name of Interviewee

Date

Signature

Researcher

Date

Signature

1 for interviewee; 1 for researcher

HPA INTERVIEW QUESTIONS

Study Title:

Health and the Environment:

A Critical Enquiry of the Construction and Contestation of Ecological Health

Background information:

- Where do you work?
- What is your job title?
- What is your background and how have you come to be interested in the links between the environment and public health?

Your work and the environment:

- When you think about the environment and public health what does the environment mean to you?
- What links between health and the environment currently interest/concern you the most and why?
- What are you trying to achieve in your work that links the environment and public health?
- Are there any environmental issues that are important to the department that you work in?
- Exactly what kinds of natural environmental health determinants do you work with?
- Are there any models you use to help you think about the environment in your work?
- Are the kinds of views you take on public health and the environment shared by your colleagues and reflected in the organisation that you work for?
- Do you see reasons to use integrated health principles in your work?
- What kind of resources do you draw upon when doing your environmental public health work? Policies (national/international), scientific research, international mandates and declarations, academic publications, the experiences of public health colleagues...?
- What kinds of support and challenges do you get to making links between the environment and public health? Why do you think this is? Do you see this is changing over time? How?
- Does the concept of ecology ever figure in your work?
- Have you ever heard of EcoHealth or Ecological Health?
- What kind of work, if any, would you like to do in the future that relates to the environment?
- What role do you think a public health organisation or movement should have in society?
- Any other questions, comments, feedback?

UKPHA INTERVIEW QUESTIONS

Study Title:

Health and the Environment:

A Critical Enquiry of the Construction and Contestation of Ecological Health

Background information:

- Where do you work?
- What is your job title?
- What is your background and how have you come to be interested in the links between the environment and public health?

Your work and the environment:

- When you think about the environment and public health what does the environment mean to you?
- What links between health and the environment currently interest/concern you the most and why?
- What are you trying to achieve in your work that links the environment and public health?
- Are there any environmental issues that are important to the department that you work in?
- Exactly what kinds of natural environmental health determinants do you work with?
- Are there any models you use to help you think about the environment in your work?
- Are the kinds of views you take on public health and the environment shared by your colleagues and reflected in the organisation that you work for?
- Do you see reasons to use integrated health principles in your work?
- What kind of resources do you draw upon when doing your environmental public health work? Policies (national/international), scientific research, international mandates and declarations, academic publications, the experiences of public health colleagues...?
- What kinds of support and challenges do you get to making links between the environment and public health? Why do you think this is? Do you see this is changing over time? How?
- Does the concept of ecology ever figure in your work?
- Have you ever heard of EcoHealth or Ecological Health?
- What kind of work, if any, would you like to do in the future that relates to the environment?
- What role do you think a public health organisation or movement should have in society?
- Why are you a member of the UK HPA or attending the annual conference of the UK PHA?
- What is the role of the UK HPA within the context of public health in the UK? How is this role different than that of the UK PHA?
- In the UK, who should be responsible for addressing the links between the environment and human health?
- What would you like to see happening in the future in public health work on the environment?
- Any further thoughts, comments, questions?

INTERNATIONAL INTERVIEW QUESTIONS

Study Title:

Health and the Environment:

A Critical Enquiry of the Construction and Contestation of Ecological Health

Background information:

- Where do you work?
- What is your job title?
- What is your background and how have you come to be interested in the links between the environment and public health?

Your work and the environment:

- When you think about the environment and public health what does the environment mean to you?
- What links between health and the environment currently interest/concern you the most and why?
- What are you trying to achieve in your work that links the environment and public health?
- Exactly what kinds of natural environmental health determinants do you work with?
- Are there any models you use to help you think about the environment in your work?
- Are the kinds of views you take on public health and the environment shared by your colleagues and reflected in the organisation that you work for?
- Do you see reasons to use integrated health principles in your work?
- What kind of resources do you draw upon when doing your environmental and health work? Policies (national/international), scientific research, international mandates and declarations, academic publications, the experiences of public health colleagues...?
- What kinds of support and challenges do you get to making links between the environment and public health? Why do you think this is? Do you see this is changing over time? How?
- How does the concept of ecology figure in your work?
- Do you encounter challenges to working on health issues using ecological concepts and if so can you give me some examples of some of your experiences?
- What are your perspectives on the EcoHealth framework and its utility for public health?
- What work do you envision yourself doing in the future?
- What role do you think a public health organisation or movement should have in society?
- What would you like to see happening in the future in public health work on the environment?
- Any further thoughts, comments, questions?

Appendix Four: Summary of Systematic Content Analysis of Journals

Journal of Critical Public Health

Journal of Critical Public Health Key Word Usage Summary

Earth

General conceptual arena/discourse within which research term found:

Sustainable development; new social movements

Usage of research term to refer specifically to the natural environment:

Earth as context; earth as having limits; interdependency of health on the earth

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Resilience thinking; sustainability as a healthy future; sustainability science; imperative of public health to adopt an ecological approach

Planet

General conceptual arena/discourse within which research term found:

Wider environmental context; globalisation; social movements and organisations such as Friends of the Earth

Usage of research term to refer specifically to the natural environment:

Planet as context; planetary limitations and the dependency of its inhabitants, including humans, on planetary systems

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Joined up thinking; amplified the idea of studying health at the scale of the planet as an integrated system and context

Nature

General conceptual arena/discourse within which research term found:

emotional health; nature as a state of health and wellbeing; (new) genetics; nature as linked to risks; globalisation and health; food and nutrition; political nature of...; nature defined as separate from experience; natural resources; natural capital; natural selection; temporal nature of...; nature or nature explanation of behaviour; human nature

Usage of research term to refer specifically to the natural environment:

nature as implicated in global epidemic emergences such as infectious diseases; nature as linked to sustainable development; connection between health of nature and health of people, as in breast cancer epidemic; nature as a source of environmental risks

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Hippocratic view of the body as a microcosm of nature; sustainability science as an integrative framework; decontextualisation from nature; Goethean approach to science; sustainable public health

Environment

General conceptual arena/discourse within which research term found:

Environmental risk of breast cancer; health inequalities; pandemic geographies of mental health; social construction of reality; workplace; community epidemiology; health promotion; The Ottawa Charter of Health Promotion; health promotion strategies; Health Impact Assessments; social determinants of health; behaviour change; climate change; WHO Commission on Social Determinants of Health; evidence based policy and practice; social responsibility and corporate citizenship; global public health; environmental or green procurement of commissioning within policy and planning; phenotypic consequences of gene-environment interactions; emerging risk patterns; the impact of 'vested interests' in environmental health research; breast cancer/environment movement; lived environment; spatiality

Usage of research term to refer specifically to the natural environment:

Natural environment; settings based approach which extends to include the natural world; impact of environmental change on human health; climate change; re-energising the environmental movement; environmental damage; environmental impacts

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Healthy settings; settings based approach; supportive environments; environmental change; environmental social movements; upstream influences on health; social determinants of health; moral importance of an equitable world; knowledge networks; subjective well-being and critiques of the concept;

public health as multidisciplinary; knowledge translation; evidence based theory and practice and its limitations; political decision making models, esp. the problem-solving model for pound environmental and social change operations; whole systems model of practice; environmental wellbeing; virtuous cycles; 'whole life costing'; intersectionality; sustainability ideals; interconnection as a truism; shifting away from 'sewerage principle' to the 'ecological principle' in public health; sustainable health promotion response; environmental stewardship; environmental risk hypothesis; environmental hypothesis; precautionary approach to environmental hazards; plural environments; environmental justice; 'total environment'; greening settings

Biology

General conceptual arena/discourse within which research term found:

Sexuality and sexual health; bio banks; mental health; race and ethnicity; genetics and genomics; breast cancer; chronic disease; Popular science; genomics; health promotion; Intersectionality of health determinants; psychosocial; social behaviour; pandemic influenza; women's health; biological pathways; biological heritage; collection and use of biological specimens; biological potentialist view of human nature which emphasises possibilities; bio-social experience, i.e.. gender; bio cultural; race and ethnicity; biotechnology; biological markers; DNA; phenotypes; the digitization of biology through genetics; molecular biology; organismic biology; the biological universe; genticization of biology and society; biological citizenship; challenges of interdisciplinarity

Usage of research term to refer specifically to the natural environment:

Biological expression of genetic-environment interaction; biological expressions of illness and disease; biological requirements for health and wellbeing; biology and the discipline of; biological activities driven infectious disease emergences and transmission

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Biological imperatives for health; interrelationships between biological and social determinants of health; resilience; vulnerabilities; causal pathways; cumulative effects and circumstances; risks over the lifecycle; moving away from a biologically based causal model to a multiple determinants model; complexity of biological systems; biological citizenship; bio sociality

Ecology

General conceptual arena/discourse within which research term found:

Ottawa Charter; new social and health movements; multidisciplinary or integrated views; ecological models of health as studying health as linked to context as conceptualized on the micro-, meso- and macro-levels; ecologic or contextual research strategies; ecological bias; ecological fallacy; retrospective ecological studies

Usage of research term to refer specifically to the natural environment:

Heat waves and public health; Deep Ecology Movement; Blueprint for Survival; ecological concerns and threats; ecological sustainability

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Ecological models of health as studying health as linked to context as conceptualized on the micro-, meso- and macro-levels; ecological public health; interdependence of four dimensions of life: a. physiological, b. material (of which natural ecology is part), c. social world and structures, d. cultural and cognitive or behavioural; natural ecology; equity; conviviality; global responsibility; health commons; complexity; interconnectedness; interdependence; holism; integration; forms of knowledge; ecological tipping points; Bronfenbrenner's systems theory; contextual levels; thinking ecologically or integratively

Ecosystem***General conceptual arena/discourse within which research term found:***

Countries that are biodiverse as a descriptor of a setting

Usage of research term to refer specifically to the natural environment:

People as integral to ecosystems; sustainability and public health; loss of ecosystems and its implications for health

Discourses/academic conversations to which specialised usage of research term (above) contributes:

For sustainability the organisation of ecosystems must have interdependence, cyclical processes, cooperation, partnership, diversity, flexibility and coevolution; stability; sustainability: ecosystem degradation as a threat to sustainability

Biodiversity***General conceptual arena/discourse within which research term found:***

Prisons adopting policies of sustainability which include attention to biodiversity

Usage of research term to refer specifically to the natural environment:

Loss of biodiversity; biodiversity and food production, food policy, nutritional status; topic of international governance mandates and also reform; subject of research on public health strategies and their reorientation; biodiversity as a consideration within green and healthy futures; concept for consideration within elaboration on frameworks for policy in global health

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Health as a global public good, i.e. biodiversity; biodiversity as an inherently global public health issue; biodiversity as a way to see the links between local and global activities and health pathways

Climate

General conceptual arena/discourse within which research term found:

Sustainable development; governance issues; policy contexts; new approaches in public health; climate as descriptor for the 'feeling' of a setting, i.e. the work climate or policy climate

Usage of research term to refer specifically to the natural environment:

Climate change as a subject for health equity and sustainability, healthy futures; links between climate change and health damaging behaviours such as overconsumption and obesity; climate change as subject prompting revisiting of health frameworks and a rethinking of the Ottawa Charter; climate change as prompt to make public health more radical; rethinking health determinants through climate change; change in climate, such as heat waves and their health implications for specific places and people; climate as framework for thinking about health and social trends such as oil dependency.

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Climate change as a generative subject for elaborations on research methodologies, theoretical frameworks, topical priorities, ways of thinking about the links between health and the planet as connected by social and economic activities

Weather

General conceptual arena/discourse within which research term found:

Weather as a factor which impacts physical activity; weather as subject within work on food politics and policies

Usage of research term to refer specifically to the natural environment:

Fluctuations in weather patterns as having impact of health behaviours and setting, such as heat waves; weather as linked to food production, nutrition and health; weather as a factor within public health efforts towards sustainability; weather as a variable within medical cosmologies, such as Indigenous health

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Weather as a variable within systems thinking about health, illness and disease; weather as an environmental vector; weather as integral to some medical cosmologies and medical practices; shifts in weather patterns as a stressor on health

Air

General conceptual arena/discourse within which research term found:

Tobacco smoke; air bags; health inequalities; Heat; urban neighbourhoods; deprivation; air quality and children's health, for example in relation to tobacco smoke or urban air pollution; air as metaphor, i.e. 'to clear the air'; air as a subject of discussion within theories of health and space

Usage of research term to refer specifically to the natural environment:

Breast cancer; epidemics and links to air pollution; deprived communities, air quality and health injuries; neighbourhood health with air quality as an environmental measure; health equity; air quality as a site of negotiation about public health jurisdictions; air as aspect of geographical approach to health studies; measure of efficacy of area-based health interventions; consideration within 'epidemic space'

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Air as a subject within environmental public health; air quality as a significant public health issue, particularly in urban contexts; air quality as important to health; links between agents and activities which damage air quality

Water

General conceptual arena/discourse within which research term found:

Water as metaphor, i.e. blood is thicker than water or 'x issue muddies the waters'; water additives and health, i.e. fluoride

Usage of research term to refer specifically to the natural environment:

Water, waste and health; water as a subject of global health; water and new social health movements; potable water as a health issue; safe water as a right; water as an environmental epidemiological variable

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Water as an important subject to human health particularly in context of poverty and in relation to global health; water as environmental vector; water as a resource over which competition occurs and around which peaceful new social movements are being organised; water as an epidemiological variable

Chemical

General conceptual arena/discourse within which research term found:

Medicine; drugs; Tobacco; smoking cessation; diet; protocols for handling chemical hazards; chemical hazard management and preventing occupational disease and injury; strategies and techniques for studying chemical hazards: 'green chemistry'; subject of interest for new social movements

Usage of research term to refer specifically to the natural environment:

Chemical incidents; organic chemical hazards to health;

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Concern about chemical hazards and contamination point to the importance of particulates to health; research on current public health work on chemical hazards and incidents as frameworks to understand and work from

Environmental Health

General conceptual arena/discourse within which research term found:

Environmental health - the discipline; the role of environmental health workers in public health

Usage of research term to refer specifically to the natural environment:

Multidisciplinary; transdisciplinarity; challenges of acceptance and valuation of environmental health practices and professionals within public health frameworks; medical and nonmedical members of the public health work force

Discourses/academic conversations to which specialised usage of research term (above) contributes:

building a "multidisciplinary public health work force" - its rise after 1997 and the affiliated tensions; professional project; governmentality; manipulated emergence; traditional disciplinary frameworks; competence; gatekeeping and authority

EcoHealth

None

Journal of Epidemiology and Community Health
Key Word Usage Summary

Earth***General conceptual arena/discourse within which research term found:***

Lunar phases; earth's temperature zones; terrestrial surface; earth's rotation (as conceptual metaphor); earth's population; contamination of earth; earthquakes; plural nature of problems; natural history

Usage of research term to refer specifically to the natural environment:

Earth systems; earth cycles; earth interactions; earth as meta-context; earth's biosphere; lunar phases; planetary motion; earthquakes; the earth's surface and what is visible of it using GPS; Earth as an orienting concept such as in the case of social movements and activist groups such as 'friends of the earth'

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Earth as meta-context (i.e. biosphere); different kinds of technologies provide different lens through which the earth becomes visible

Planet***General conceptual arena/discourse within which research term found:***

Planetary motion; pollution of the planet

Usage of research term to refer specifically to the natural environment:

Poetry on Planet Earth, referring for example to the Earth as a ship; meta-context of human activity; responsibility for the care of the planet; greenhouse effect and climate change

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Planet as meta-context

Nature***General conceptual arena/discourse within which research term found:***

Natural history; the nature of...; social and natural factors; rural environment; natural experiment; work environment; biological factors; urban or rural

communities; natural processes; natural history; epidemic nature; natural resources; naturalistic

Usage of research term to refer specifically to the natural environment:

Natural green space; environmental aetiology; natural environment; natural processes; natural occurrences of illness

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Precautionary principle; natural green space

Environment

General conceptual arena/discourse within which research term found:

Gene-environment interaction; global environmental change; environmental inequality; environmental cancer; greenspace; habitat; epidemiology

Usage of research term to refer specifically to the natural environment:

Gene-environment interaction; global environmental change; environmental inequality; environmental cancer; greenspace; habitat; urban, built, rural, material and neighbourhood; environments; 'broken window index' and 'boarded up window index' as a proxy for poverty in epidemiological studies between neighbourhood and health

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Contextual effects; environmental gradients; need a multi-sectorial, multidisciplinary approach to studying health determinants

Biology

General conceptual arena/discourse within which research term found:

Biological aging; evolutionary biology; biological correlates; biological effects; biological sciences; biological monitoring; biomarkers; zoonotic risk factors; molecular biology, e.g.. biomarkers; molecular epidemiology; Eco epidemiology; biology of outbreaks; biological factors in chronic illnesses; biological factors of acquired illnesses, such as breast cancer, asthma; biosocial factors; biological nature

Usage of research term to refer specifically to the natural environment:

Biological aging; evolutionary biology; biological correlates; biological effects; biological sciences; biological monitoring; biomarkers; zoonotic risk factors; molecular biology, e.g.. biomarkers; molecular epidemiology; Eco epidemiology; biology of outbreaks; biological factors in chronic illnesses; biological factors of acquired illnesses, such as breast cancer, asthma; biosocial factors; optimality theory in evolutionary biology; neo Darwinian evolutionary theory; systematic biology

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Limitations of the social and biological disciplines; epidemiology with its biological to social methods can serve as a bridge between the social and the biological; there are no universal laws in biology, except for the genetic code in biomedicine; laws in biomedicine are 'middle range theories' so biological events can be described in a number of ways; Risk factor epidemiology and the question of confounders and the balance between biological forces and social context which raises questions, therefore, about the balance between the hermeneutic components and the scientific basis of medical issues.

Ecology

General conceptual arena/discourse within which research term found:

Human ecology; social ecology' ecological philosophy; environmental psychology; ecological community psychology; contextual studies; complexity; activity setting; adaptation; behaviour setting; community; human community; context; cycling of resources; dominance; ecological community psychology; ecological depth

Usage of research term to refer specifically to the natural environment:

Ecology as a natural community of which humans are part

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Key theorists working on health and ecology: Roger Barker; Jim Kelly, Urie Brofenbrenner; Rudolph Moos; (more recent): Nancy Krieger; Daniel Stokols

Ecosystem

General conceptual arena/discourse within which research term found:

Epidemiology; disease clusters; politics; iconography of health inequalities; environmental influences on healthcare expenditures; community stress; medicine is politics at a large scale.

Usage of research term to refer specifically to the natural environment:

Infectious disease emergencies; environmental epidemiology; women's health, cancer and the environment; impacts of a tsunami; recreational value of the natural environment; global environmental change and public health research agendas; ethics and epidemiology; prevention of chemical exposures; effect of PCBs on children; development of an ecologically minded public health.

Discourses/academic conversations to which specialised usage of research term (above) contributes:

The development of an ecologically minded public health; children's health and the environment; disease clusters and patterns within space.

Biodiversity

General conceptual arena/discourse within which research term found:

Bio piracy

Usage of research term to refer specifically to the natural environment:

Biodiversity loss; biodiversity as a subject for research agendas on global environmental change and health; biodiversity as a framework for reviewing the environment within epidemiology; biodiversity as a site requiring international cooperation

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Biodiversity as an emerging measure of the efficacy of conceptualisations of environmental health determinants and research agendas for health and global environmental change; biodiversity as important to human health

Climate

General conceptual arena/discourse within which research term found:

Evaluation of carbon footprint of climate change events, such as conferences; climate as metaphor, i.e. the political climate; climate as a social health determinant, i.e. impact of psychosocial work climate on health

Usage of research term to refer specifically to the natural environment:

Climate change as a subject for global health studies; links between climate change and infectious disease emergencies; mortality as linked to climate fluctuations; climate change as a category treated as a health determinant; changes in climate as affecting distribution of disease; long term measures of effects of changes in climate on health; linking climate change to specific environmental variables and their impacts on health, i.e. climate and heat or climate and air pollution and health; heat waves as a key focus of climate change health injury; relationships between climate and health trends such as births, infant mortality, ambulance response calls; seasonality as an expression of climate in health studies

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Climate change as a catalyst for rethinking public health structures, agenda, strategies; climate change as a way to make links between social systems and practices and health, such as the global economic system and health care; climate as an environmental vector and variable which shows change in health and illness trends

Weather

General conceptual arena/discourse within which research term found:

Effect of weather on physical activity; interdisciplinary exchange between public health practitioners and weather forecasters - exchanging knowledge

Usage of research term to refer specifically to the natural environment:

Meteorological factors; links between fluctuations in weather and disease outbreaks, with a focus on temperature variation; the effect of weather on health, i.e. the effect of wind on SIDS; seasonal variations as a explanation for sex and age specific variations in the population, i.e. physical activity; greenhouse effect; weather as a factor in accidents, such as shipping accidents and their health consequences

Discourses/academic conversations to which specialised usage of research term (above) contributes:

The importance of the links between weather variations, particularly extreme fluctuations in temperature (i.e. heat waves and cold snaps), and public health; weather as a health factor, for example in studying the links between power, petulance, weather and war; air pollution as a key issue pertaining to weather and health, as expressed through asthma for example; methodological considerations for studying weather as a health factor

Air

General conceptual arena/discourse within which research term found:

Air pollution; air quality and its impacts on health and health behaviour, e.g.. Warnings and outdoor activities; sickness in air passengers; air disasters; air quality and smoking; royal air force and health issues specific to it; studies in air hygiene

Usage of research term to refer specifically to the natural environment:

Links between dietary habits and the effects of air pollution on health; environmental air pollution and its effects on health; geographical differences in air pollution exposure; tropospheric ozone and health impacts; air pollution and inequality; air temperature and disease outbreaks, such as influenza

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Comprehensive approach to the links between environmental air pollution and health

Water

General conceptual arena/discourse within which research term found:

Quality of drinking water and health impacts on particular populations, i.e. maternal health; water contamination and water hazards and health; access to drinking water and implications for health; water consumption and additives to drinking water, i.e. sweetened beverages and health; washing water - access to and quality - and links to health; water treatment practices; water additives, such as fluoride and implications for health; water sodium levels and health; right to safe drinking water; water as metaphor, i.e. blood thicker than water; poverty and water; relationship between water hardness and disease, such as heart disease

Usage of research term to refer specifically to the natural environment:

Geochemistry of groundwater; water microbiology; trace elements in water; water contamination incidents; sea water contamination; oil spills and health; zoonoses and water; humidity and illness; turbidity of drinking water and infection incidents; diseases found in sea food; children's vulnerability to water pollution; waste water, drains, and exposures; preventing water borne diseases; studying water sites and water supplies; contaminated sea water, for example from sewage, and health; trace elements in water and links to morbidity and deformation; groundwater contamination; waterborne illness

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Comprehensive approach to the links between environmental water contamination and health

Chemical

General conceptual arena/discourse within which research term found:

Chemical incidents; chemical industry accidents; hazardous chemicals and psychological dimensions of health sequela; chemical exposures in breastfeeding workers; chemical bombardment and impacts on sex at birth; chemical defence programmes; policies and tolerance for chemical pollutants; chemical warfare agents and links to mortality and morbidity, i.e. through cancer; accidental home poisonings, i.e. from carbon monoxide

Usage of research term to refer specifically to the natural environment:

Environmental chemicals; organic pollutants as persistent toxic chemicals, in general environment, in food supply, in water; environmental exposures to chemicals and childhood illnesses; pesticide use in farming, forestry and consequences of exposure; exposure to chemical loads and poisoning through the food chain, i.e. ingestion of meat; atmospheric carcinogens and exposure; low levels of persistent organic chemicals as health concern for future generations; pesticide use in health prevention programmes such as mosquito control; toxic poisoning of children

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Comprehensive approach to the links between chemicals in the environment and health

Environmental Health

General conceptual arena/discourse within which research term found:

Environmental determinants of health as being social, physical and natural

Usage of research term to refer specifically to the natural environment:

Natural environment as a determinant of health

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Health impact assessment; environmental determinants of health as being social, physical and natural

EcoHealth

None

Journal of Epidemiology and Community Health
Key Word Usage Summary

Earth***General conceptual arena/discourse within which research term found:***

Healing; making sense of birth, death (i.e. son's suicides); 'sexual pollution' - earth as metaphor; framework for thinking about fertility and infertility

Usage of research term to refer specifically to the natural environment:

Holistic sickening; earth as increasingly pathogenic

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Theories on CAM; linkages between health and the environment; holism

Planet***General conceptual arena/discourse within which research term found:***

Global movements, i.e. neoliberalization and globalization; context for thinking about issues, usually related to inequality, ethical debates; what is normal and right, i.e. in relation to technological innovation

Usage of research term to refer specifically to the natural environment:

Planet as context

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Foucauldian use of planet as a concept that links the material to the discursive

Nature***General conceptual arena/discourse within which research term found:***

Aging/anti-aging; gender; sexuality; fertility, infertility and reproductive technologies and techniques; genetics; bodies; illnesses; pharmaceuticals; moral work; reproduction and reproductive health issues; mental health issues; community; ethical considerations; risk; death and dying; social movements; CAM; reflecting on social constructionism; asking what is natural in terms of bodies, bodily processes and health particularly in relation to fertility, menstruation, menopause, childbirth, infant mortality, gender relations and death

Usage of research term to refer specifically to the natural environment:

Fear of nature - bio phobias; a concept used to think about materialism and biology; an agent in infectious disease work, i.e. avian influenza

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Nature typically used as a conceptual counterweight - a point of comparison or a measure - for the focus of the social theorising

Environment***General conceptual arena/discourse within which research term found:***

Socio-economic environment; health inequalities; work related health issues; built environment; housing; nature

Usage of research term to refer specifically to the natural environment:

Environmental cause of breast cancer; bio-phobia

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Environment as a health driver

Biology***General conceptual arena/discourse within which research term found:***

Reproduction; disability and theories of; genetics, genomics; new kinds of therapies, i.e. neuroscience in the treatment of psychopathy; sex and gender; bodily processes (usually of women) such as menopause; chronic illness and the body; mental and emotional health; ethnic patterning of health; new forms of citizenship; medical cosmologies and medical dominance; pharmacology, pharmacogenetics, new medicines

Usage of research term to refer specifically to the natural environment:

Sociology of disease; work on specific diseases and their impacts, i.e. HIV/AIDS; theoretical work on biology and the place of biology in sociology; history of western philosophy; critique of dualisms and binary constructions; chronic illness and the body; theorising the body and developing embodiment theories; biology and governance i.e. bio politics; new theories of pain; theories of health

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Challenges to dualisms which place biology in opposition to a variety of social phenomena such as mind, culture, the social; a technique used to discuss the materiality of existence, life, experience and so on as applied to theoretical projects such as work on the body, illnesses, and health

Ecology

General conceptual arena/discourse within which research term found:

Social organisation of movement; ecology as a framework for studying context, i.e. ecological studies of....

Usage of research term to refer specifically to the natural environment:

The ecology of diseases, such as the rise of MRSA; a way to link geographical theory and health studies; epidemiological frameworks; the study of spaces and places

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Ecology discussed in relation to cross disciplinary contributions to health research, i.e. studying health inequalities using geography; the use of epidemiological concepts; pointing to spaces beyond the urban, such as rural studies and health

Ecosystem

General conceptual arena/discourse within which research term found:

Theoretical concept, i.e. the 'ecosystem of the sick child'

Usage of research term to refer specifically to the natural environment:

Globalization, health and the environment

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Systems thinking about health

Biodiversity

General conceptual arena/discourse within which research term found:

Biodiversity as a determinant of health

Usage of research term to refer specifically to the natural environment:

Biodiversity as linked to disease emergencies such as MRSA

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Health as affected by elements of the natural world, particularly other organisms

Climate

General conceptual arena/discourse within which research term found:

The quality of the environment as determined by the interaction between people and social structures, i.e. the work climate or a chilly climate

Usage of research term to refer specifically to the natural environment:

Climate change, as a global issue, a newly emerging issue for the public health system; climate as having impacted food production systems over time; changes in the earth's climate; health and the media studies, climate as an example; the environmental causes of illnesses, such as breast cancer; social movements and health

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Climate is used primarily as an example for changes in social awareness, the activities of social movements, a health determinant, a subject of growing import to health studies

Weather

General conceptual arena/discourse within which research term found:

An environmental dynamic which people sense; a topic of conversation in studies on 'small talk'; a factor which affects people's choices and behaviour such as diet, exercise, socialising habits and recreational spaces chosen; reasons given for illness in illness accounts; an object of delusional thinking - an element outside of human control; an element that impacts social activity, such as shipping; weather related to accidents

Usage of research term to refer specifically to the natural environment:

Draws the links between the human senses and natural dynamics such as weather patterns; weather as a ubiquitous presence that is taken for granted and used this way in discourses, narratives and other sense making practices of people when describing illness, what exacerbates illness, what causes it; weather as an uncontrollable force that affects human activities

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Weather as a natural element

Air

General conceptual arena/discourse within which research term found:

Policy formation around air quality issues; a topic through which to evaluate work such as the Black Report; medical procedures and examinations and theories of body work, respiratory exams as an example; behaviour, illness and responsibility, passive smoking and air quality as a confounding example; air as

used in lay and medical accounts as a subject for theories of sense making; air as an entry into theorising space and health, i.e. the impact of smoke on an 'air space'; air as metaphor, i.e. 'the feeling was in the air'

Usage of research term to refer specifically to the natural environment:

Respiratory illness; air as aetiology of chronic illness and contestations of these phenomena; air quality and empirical subjects linked to it such as smoking, air pollution, vehicle use; air as a health vector as in airborne diseases

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Air as a natural element which impacts human health; air as environmental vector; air quality as a research topic

Water

General conceptual arena/discourse within which research term found:

Water as metaphor, 'baby with the bath water'; water used in health management of conditions; water and infectious disease; water as resource which is shared and around which social negotiations in social space occur, i.e. ordering water, sharing water and negotiating illness stigma; water as used as a medical cure, examples in studies on biomedicine and CAM; eating behaviour and water as part of a healthy diet

Usage of research term to refer specifically to the natural environment:

Water quality in the developing world and implications for morbidity and mortality

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Water as an environmental vector; water contamination and disease burden

Chemical

General conceptual arena/discourse within which research term found:

Chemicals in the human brain - dementia, biomedicine, diagnostic tools, trauma; genetics

Usage of research term to refer specifically to the natural environment:

Chemical poisoning as a cause of illness; chemical waste: chemical hazards

Discourses/academic conversations to which specialised usage of research term (above) contributes:

The relevance of particulates to human health, i.e. multiple chemical sensitivities; environmental health hazards and exposure trends by socioeconomic measures

Environmental Health

General conceptual arena/discourse within which research term found:

New social movements and health; environmental determinants of health as social context, built environment, physical environment; framework for appraising health risks from social and physical environments; framework for thinking about social disadvantage and ill health; lived environment, i.e. housing as health determinant; framework to think about diseases of modernity and lifestyle; health risks

Usage of research term to refer specifically to the natural environment:

Environmental causes of illness; contested illness; natural environment as determinant of health

Discourses/academic conversations to which specialised usage of research term (above) contributes:

Framework for thinking about the environmental determinants of health

EcoHealth

None